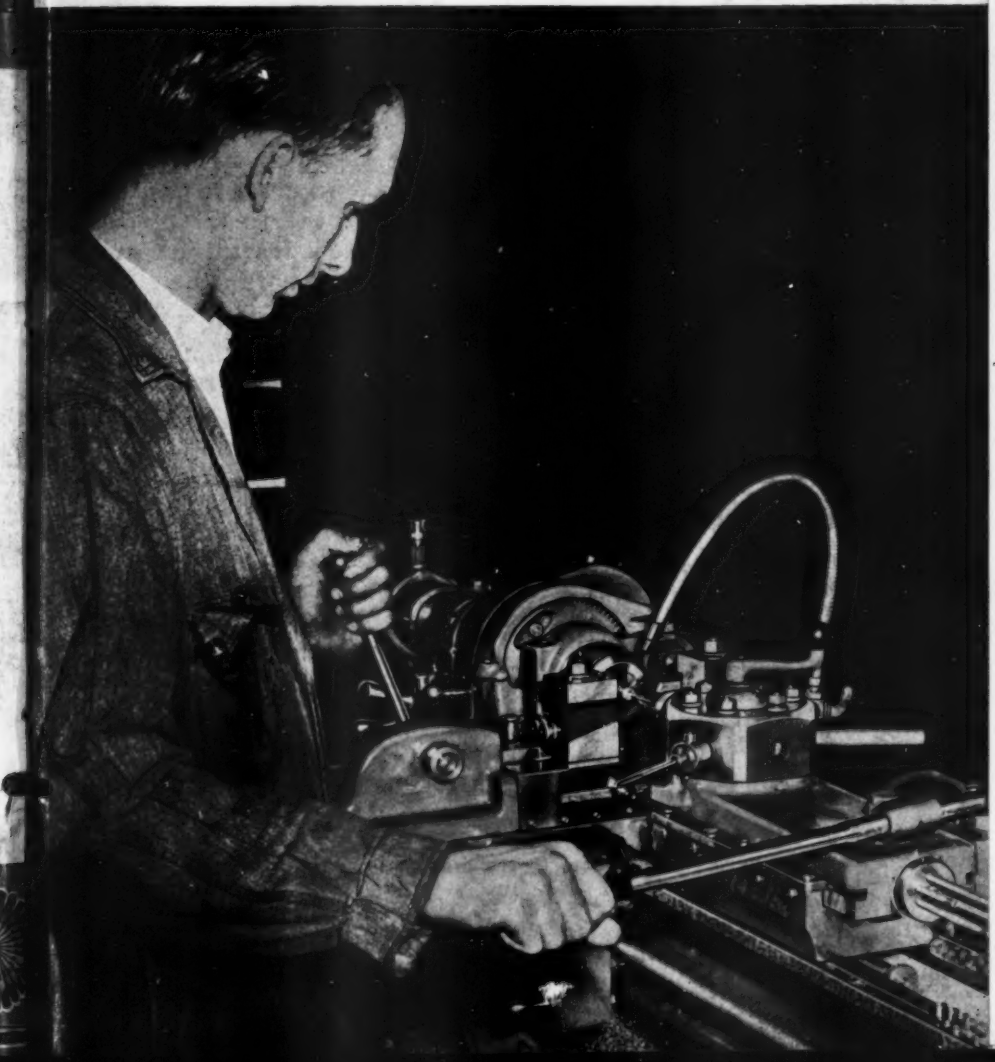
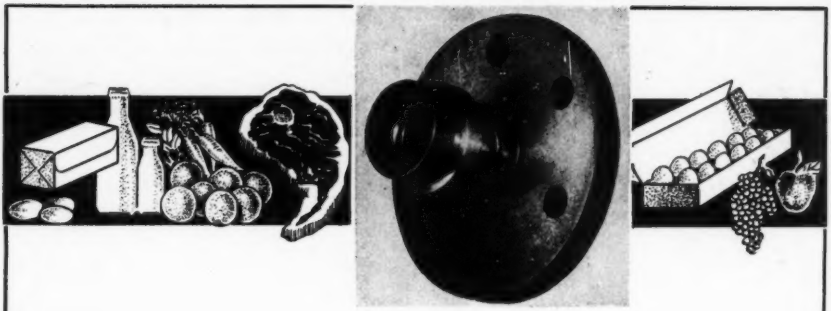
The Refrigeration Service Engineer

VOL. 10 NO. 10 ★ ★ ★ OCTOBER . 1942





Service Men are
Conservators of the Nation's Food Supply

UPON THEM the country has imposed the patriotic duty to maintain existing refrigeration equipment, thereby assuring food conservation and the necessary protection for the health of our people.

Chicago Seals with the new self-adjusting sleeve lock aid service men in their important work by providing a triple sealing action on rotating compressor shafts.

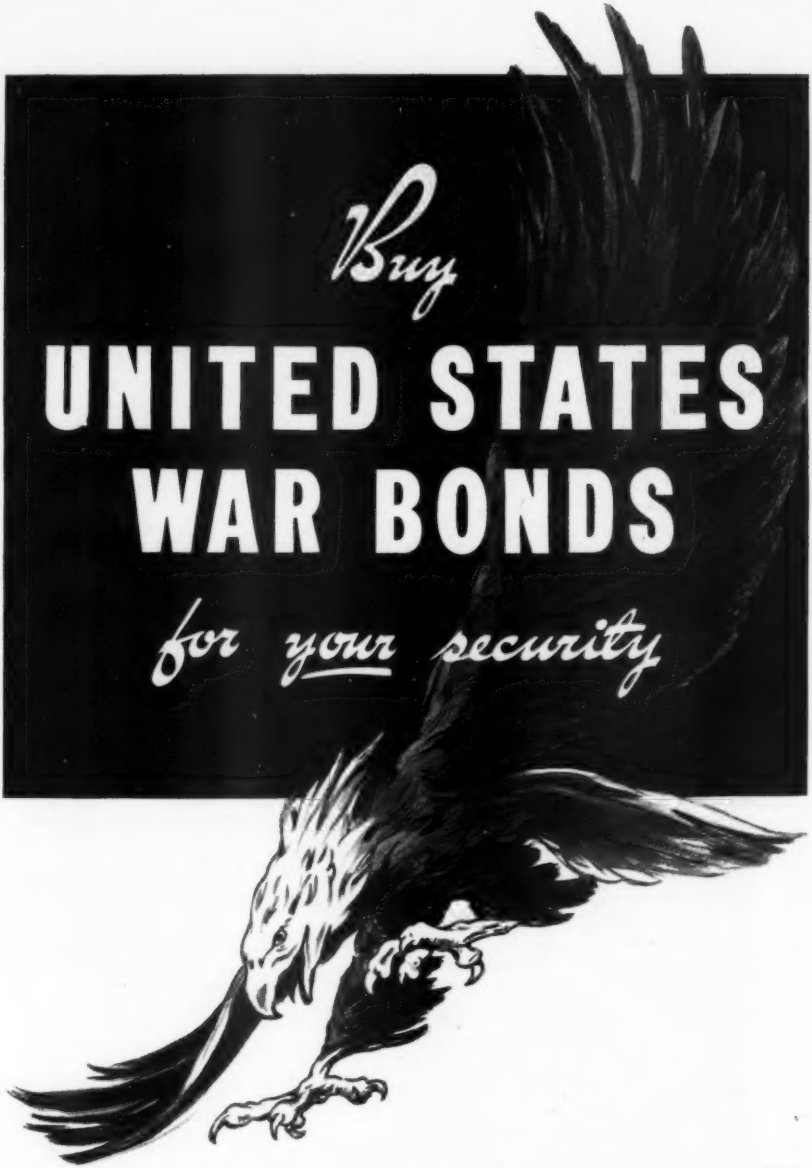
Due to the raw material situation, your jobber has been delayed in obtaining his stock of Chicago Seals. Shipments now being made will rectify this condition.

Ask your Jobber for Chicago Seals.

Chicago **Seals**

CHICAGO SEAL CO. 20 North Wacker Drive CHICAGO, ILLINOIS

THE REFRIGERATION SERVICE ENGINEER, Nickerson & Collins Co., Publishers, 435 N. Waller Ave., Chicago, Ill. Published monthly. Vol. 10. No. 10. October, 1942. Entered as second class matter March 4, 1938, Chicago, Ill., under the Act of March 3, 1879. Subscription in United States, $2.00 per year; all other countries, $3.00 per year.



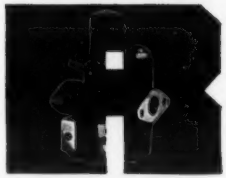
RS-34

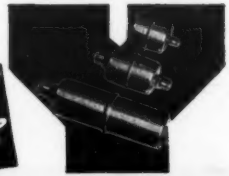
ANSUL CHEMICAL COMPANY

U.S. NEEDS U S STRONG
Helping
UNCLE SAM..

REFRIGERATION VALVES ARE

No. 206 Thermostatic Expansion Valve
No. 88 Thermostats
No. 220K Thermostatic Expansion Valve
No. 270 Solenoid
No. 204 Automatic Expansion Valve
No. 70N Solenoid Refrigerant Valves
"TRAP-IT"





For America! THROW YOUR SCRAP INTO THE FIGHT!

Helping UNCLE SAM..

Eating nutritional foods under Uncle Sam's nation wide drive for better nutrition, is easy today.

Refrigeration, Dependably Controlled with A-P Valves, enables Americans to have *all* the keen, stimulating, appetite-arousing tang out of their nutritional foods by keeping them fresh in transit and in storage.

Keeping present refrigeration equipment operating at peak efficiency for Wartime Food is a pledge Servicemen and A-P Valves can handle easily.

AUTOMATIC PRODUCTS COMPANY
2454 NORTH THIRTY — SECOND STREET
MILWAUKEE WISCONSIN
Export Dept. 100 Varick St., New York City

AP DEPENDABLE Refrigerant Valves

Service "GENUINE DETROIT" Flashes

VOLUME 5 DETROIT, MICH.

Published in the Interest of Equipment Conservation through More Effective Servicing

Condenser Obstructed—Strainer Clogged—Loss of Liquid Head

CONDENSER OBSTRUCTED. **On commercial jobs and especially unit systems such as ice cream cabinets, the flow of air over the condenser may be obstructed by merchandise stacked around the cabinet. The condenser should be cleaned occasionally to remove dirt accumulation. In certain localities water-cooled condensers must be periodically cleaned.**

STRAINER CLOGGED. **Causes starved evaporator and low suction pressure. If strainer is at the condensing unit the liquid line will be cold, due to restriction in strainer. This condition also shows up**

Detection:

A. Feel liquid line beyond line strainer to make

is a drop in pressure in the liquid line due to the weight of the column of liquid. With Freon, this pressure loss amounts to 10 pounds for each 18 feet of head; with SO_2, 10 pounds for each 17 feet of head; and for Methyl Chloride, 10 pounds for each 26 feet of head.

On water-cooled machines where head pressure is usually kept low or on air-cooled machines in cold places the loss in head may retard flow of refrigerant to the evaporater. The result will be low suction pressure and possible starving of evaporator.

Detection:

A. Calculate loss in head using known height

and low suction pressure. If strainer is at the condensing unit the liquid line will be cold, due to restriction in strainer. This condition also shows up

erant to the evaporator. The result will be low suction pressure and possible starving of evaporator.

Detection:

A. Feel liquid line beyond line strainer to make sure it is not being cooled by pre-expansion.

B. Install gauge in liquid line just ahead of valve and observe actual liquid pressure at valve.

C. Check strainer in valve body to make certain that it is clear.

LOSS OF LIQUID HEAD. When the evaporator is located several floors above the compressor there

Detection:

A. Calculate loss in head using known height of evaporators above compressor and figures given above for various refrigerants.

B. Feel liquid line and observe any tendency to become cold as height increases. This condition may also be caused by undersize liquid line.

C. There is likely to be a hissing sound at the expansion valve similar to obstructed liquid line or shortage of charge.

A complete Service Analyzer, giving many helpful hints, will be sent upon request.

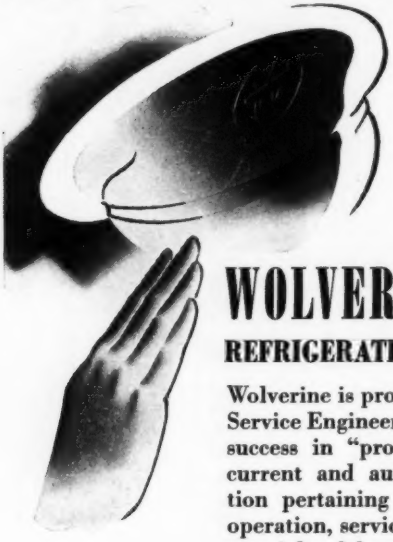
SYMPTOMS					PROBABLE CAUSE
Condition of Job	*Evaporator Condition*	*Running Time*	*Suction Pressure*	*Suction Line Temperature*	
Warm	Warm	Continuous	High	Warm or Normal	Condenser Obstructed
Warm	Warm	Won't Start	Low	Warm	Strainer or liquid line clogged or liquid line too small
Warm or Normal	Starved or Partly Refrig.	Short Cycle	Low	Warm	Loss of liquid head, strainer or liquid line clogged

DETROIT LUBRICATOR COMPANY

General Offices: DETROIT, MICHIGAN

Canadian Representatives: Railway & Engineering Specialties Ltd., Montreal, Toronto, Winnipeg

COOPERATION WINS THE WAR



WOLVERINE SALUTES

REFRIGERATION SERVICE ENGINEERS

Wolverine is proud to salute the Refrigeration Service Engineers Society . . . for its impressive success in "providing its membership with current and authentic educational information pertaining to the design, construction, operation, servicing and maintenance of commercial and domestic refrigerating equipment" . . . and for its equally outstanding achievement in encouraging "the adoption of ethical standards of practice and assisting in the stabilization of the service business."

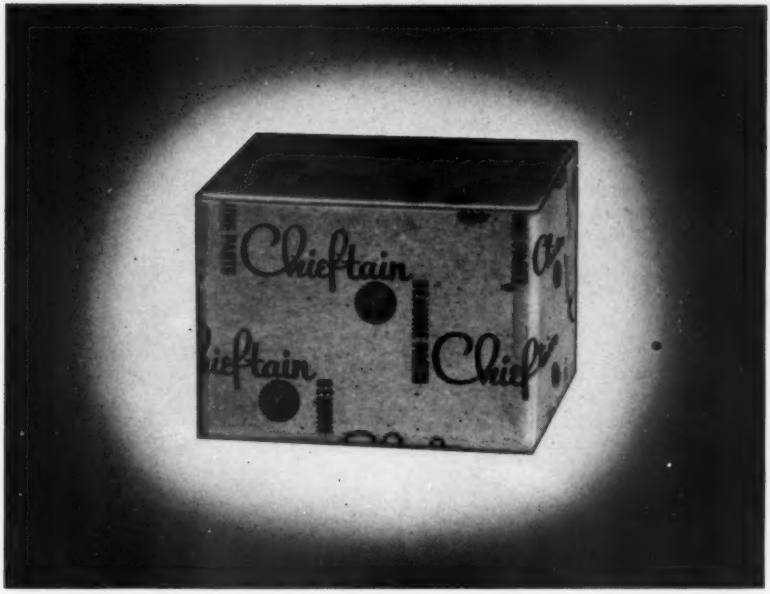
MR. E. A. PLESSKOTT
President of the Refrigeration Service Engineers Society.

Now in its tenth year, the Refrigeration Service Engineers Society today numbers approximately 2,000 members in 65 local chapters in the United States and Canada.

During these past ten years, Wolverine has wholeheartedly cooperated with this progressive organization. And to the Society, and to the refrigeration industry as a whole, we pledge present and future cooperation to the very utmost of our ability and long experience.

Wolverine will continue to offer refrigeration tube of only the highest quality—quality that is now carefully controlled from ore to finished product.

FOR YOUR PROTECTION



genuine Chieftain parts

FOR YOUR protection, Chieftain sends all its parts to you in this distinctive genuine parts carton.

Immersed in oil and sealed in Plio-Film (Patented air tight package) before it is placed in the carton. The smallest part Chieftain makes arrives moisture proof and dust proof.

Remember, it pays in the long run to buy genuine Chieftain parts.

TECUMSEH PRODUCTS CO. TECUMSEH MICHIGAN

Chieftain

The number of spot welds a machine can make in a given period can be increased by 15 to 40 times if the temperature of the electrode is *accurately controlled* within a range of 0° to 40° F., depending upon the charcteristics of the material being welded

MORE *Spot Welds* WITH ACCURATELY CONTROLLED REFRIGERATION

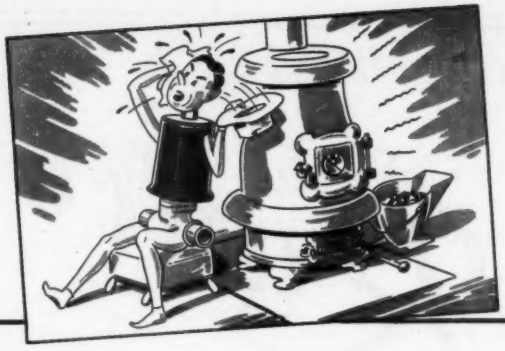
☆ ☆ ☆ ☆ **A NEW WAR PRODUCTION MACHINE TOOL FOR**

• PORTABLE RIVET COOLERS • CONDITIONING TOOL AND DIE ROOMS • COOLANT COOLING • OPTICAL EQUIPMENT MANUFACTURING • HEAT TREATMENT • COOLING ELECTRODES FOR SPOT WELDERS • MANY OTHER OPERATIONS

Accurately controlled cooling of spot welders is but one of many important ways in which refrigeration can increase war production with existing machinery. To be effective, and to perform its function to the full extent, refrigeration must be accurately controlled. Accurate control is another way of saying Minneapolis-Honeywell. Minneapolis-Honeywell Regulator Company, 2934 Fourth Avenue South, Minneapolis, Minnesota.

MINNEAPOLIS-HONEYWELL REFRIGERATION *Control* SYSTEMS

THE POLARTRON SYSTEM OF FROST-FREE REFRIGERATION

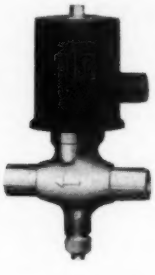


For Longer Life of Your Magnetic Valves

Keep Them Away From Heat!

Proper care in installation and maintenance of magnetic valves in any refrigeration system will do much to keep efficiency up and prolong the life of any installation. Maintenance and conservation of equipment are vitally important now, when wartime restrictions limit the production of new parts and replacements for civilian needs.

Alco Valve Company therefore suggests that you follow these service hints — one in a series of advertisements on equipment conservation and maintenance:



MAGNETIC VALVES

1. **Extreme heat is injurious to magnetic valves — therefore do not install them in small, confined, or unventilated locations.**
2. **Check the operating voltage to be sure it does not exceed the rated voltage.**
3. **Be sure a surge protector is connected across the line, otherwise line surges may short circuit.**
4. **It is advisable to install filters ahead of the valve.**
5. **Magnetic Valves must be installed in a vertical position.**

Now is the time to check your refrigeration systems on these points to assure the longest possible life for all equipment. With the approach of the heating season this is particularly important right now. Remember, too, that Alco engineers are always glad to help you in solving any maintenance or installation problem.

ALCO VALVE COMPANY

2630 Big Bend Blvd. St. Louis, Missouri

ALCO *Engineered Refrigerant Controls*

THE STANDARD OF THE INDUSTRY

Ranco

The design and productive skill which made Ranco a leader in the refrigeration industry is now also devoted to the production of instruments for the Armed Forces.

Ranco INC.
COLUMBUS, OHIO

The Refrigeration Service Engineer

Vol. 10 No. 10

October, 1942

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

Cover

One of the production type of South Bend lathes so important today in our war effort but which will be turned to the manufacture of peacetime goods when the war is over.

Published by
Nickerson & Collins Co.
433-435 North Waller Ave.
Chicago

Telephones Austin 1303-1304-1305

EASTERN OFFICE
420 Lexington Ave., New York City
Telephone Lexington 2-4816

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KEEP 'EM RUNNING

THE old story of "a stitch in time" never had greater application than today... so important is the need for keeping all existing equipment running.

While practically 100% of Weatherhead facilities are devoted to production for Victory, we appreciate the fact that the home front is vital also, and as far as possible we are supplying this front with parts, fittings and accessories—to keep refrigeration equipment running. Call on us for what you need. We cannot make long-range promises, but will do our best to take care of your requirements.

THE WEATHERHEAD CO.
300 East 131st Street
Cleveland, Ohio

WEATHERHEAD

Refrigeration Valves, Fittings and Accessories

The Refrigeration Service Engineer

Vol. 10, No. 10 CHICAGO, OCTOBER, 1942 $2.00 Per Annum

Installation and Service Accounting

The requirements of the various branches of W.P.B. are that adequate records be kept of all transactions for a period of at least two years and that they be made available at any time for inspection. Good records are of vital importance to a business enterprise at any time but under government regulations during the war period they become mandatory.

The system illustrated and explained in the following article is suggested by the Electric Refrigeration and Air Conditioning Division of Servel, Inc., Evansville, Ind., and is perhaps the simplest and most flexible system obtainable. It can be adapted to both large and small organizations from the two and three man company doing service work only to the large sales and service organization.—Editor.

TO successfully operate a service department the installation and service must be done efficiently and economically. To obtain these results it is necessary to maintain records even in small organizations. Only by critically examining past performance and comparing it with the present can we hope to discover flaws to be remedied. In this article a simple system for keeping records is suggested.

Quite often the service department has been charged with costs that should have been borne by another department. Too often has the service manager found it impossible to determine the cause of the department's losses. Proper accounting of service costs and income will not alone reduce expense, but will result in the proper allocation of expense, adequate service department income, and the elimination of unnecessary losses.

Accurate service accounting methods are of value to the sales department of the distributor's organization in determining the proper amount to set aside to cover the costs of installation and service during the free service period.

Installation Accounting

The service department should be credited with a sufficient amount to make the installation and render free service. We have found that for the average installation approximately 15% of the sales price is sufficient to set aside for this expense. This amount is to be posted to the credit of the installation involved, as indicated in Fig. 4-B. This percentage can be adjusted to meet local situations, once the records indicate this essential.

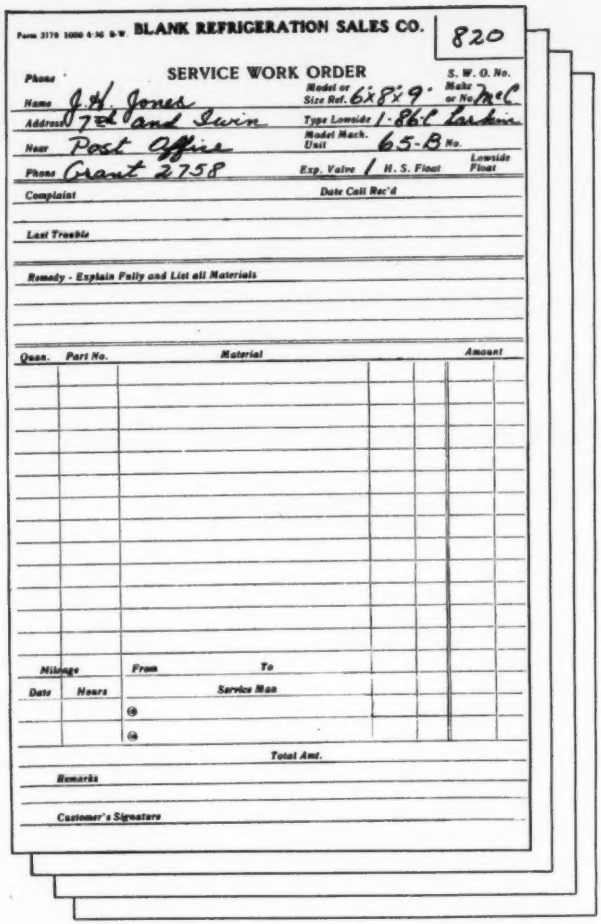
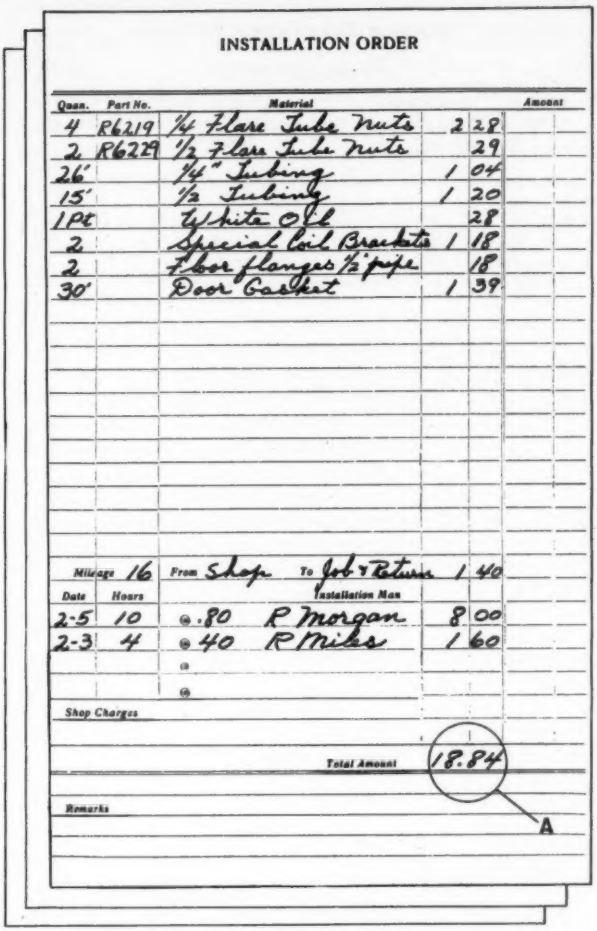


Fig. 1—The service work order which is made out in quadruplicate. The original is the customers copy; the duplicate the accounting department copy; the triplicate is the service department copy and the quadruplicate is the inspection sheet shown in Fig. 3. This inspection sheet is inserted as the fourth copy when the service work order is used as an installation order. The reverse side of this form is the installation order form shown in Fig. 2. The top part of this form is filled out from information obtained from the sales order or the survey sheet and is rubber stamped "Installation."

The service department should be furnished with a copy of sales order of the respective installation and a copy of the survey sheet. In many instances, it is assumed that the service manager will have had opportunity to personally survey the installation in question, but where this is not possible the survey sheet will suffice.

From the information on the sales order and the survey sheet, an installation order is made out. An installation order is identical to a service work order with the exception



INSTALLATION ORDER

Quan.	Part No.	Material		Amount
4	R6219	¼ Flare Tube Nuts	2 28	
2	R6229	½ Flare Tube Nuts	29	
26'		¼" Tubing	1 04	
15'		½ Tubing	1 20	
1 Pt		White Oil	28	
2		Special Coil Brackets	1 18	
2		Floor flanges ½ pipe	18	
30'		Door Gasket	1 39	

Mileage 16 From Shop To Job & Return 1 40

Date	Hours		Installation Man	
2-5	10	@ .80	R Morgan	8 00
2-3	4	@ 40	R Miles	1 60
		@		
		@		

Shop Charges

Total Amount 18.84

Remarks

A

Fig. 2—Installation order form which is the reverse side of the service order form shown in Fig. 1. The installation man fills out all information shown here in triplicate with the exception of the prices shown. These prices are costs and are computed by the service dispatcher. Prices are not shown on the customers copy. All parts and material listed in the upper part of this form are reconciled with the perpetual parts inventory record shown in Fig. 7. Total cost "A" is entered at A—Fig. 4.

that it has in the space allotted for "Complaint" the word "Installation" rubber-stamped in red ink.

The heading of the installation order is made out in quadruplicate, the inspection sheet being inserted as the quadruplicate copy.

The inspection sheet is set aside for the inspector's first trip twenty-four hours following installation, and the installation man is furnished with the original, duplicate, and triplicate copies of the installation order.

Whether or not the installation consumes more than one day, all of the material, labor,

1M F 2183 8-W-4-38 **BLANK REFRIGERATION SALES CO.** 820

INSPECTION SHEET

Number (S. W. O. No.)

Name J. H. Jones — Model or Size Ref. 6×8×9'4" — Make or Ser No. McC

Address 7th & Irwin — Type Lowside 1-86C Larkin

Near Post Office — Model Mach. Unit 6S-B4 — No. 1456

Phone Grant 2758 — Exp. Valve / — H. S. Float — Lowside Float

Remote ✓

Self Contained — Motor Make Century — H. P. 3/4 — Volts 220 — Cycls. 60

Date Installed 2-3-31 — Inspection Dates 2-4 — 3-4 — 5-3

Inspection "No." or Check ✓ First	Second	Third		First	Second	Third
✓	✓	✓	1. Check refrigerant charge			
✓	✓	✓	2. Check oil level in compressor			
No	✓		3. Was belt adjusted properly and pulleys lined up?			
✓			4. Was motor rotating right direction?			
✓			5. Was refrigerator left clean?			
✓			6. Was machine unit left clean?			
No	✓		7. Was tubing properly supported?			
✓			8. Was wiring correctly installed?			
✓	✓	✓	9. Check setting and operation of Pressure Control Thermostat			
✓	✓	✓	10. Check expansion valve adjustment			
✓	✓	✓	11. Oil motor bearings and clean commutator			
✓			12. Was lowside properly installed?			
✓			13. Instruct user in care and operation			
✓		✓	14. Is user favorably impressed - satisfied?			

Quan.	Part No.	Material			Amount		Date
1 pt		White Oil		28			5-3

Inspector	Miles @	Hrs. Labor @	Cost Miles	Plus Labor			
P. Brown	16	2	2	24			2-4
P Brown	17	1	1	64			3-4
M. Smith	16	1½	1	92			5-3
		Total Cost	6.13		C		

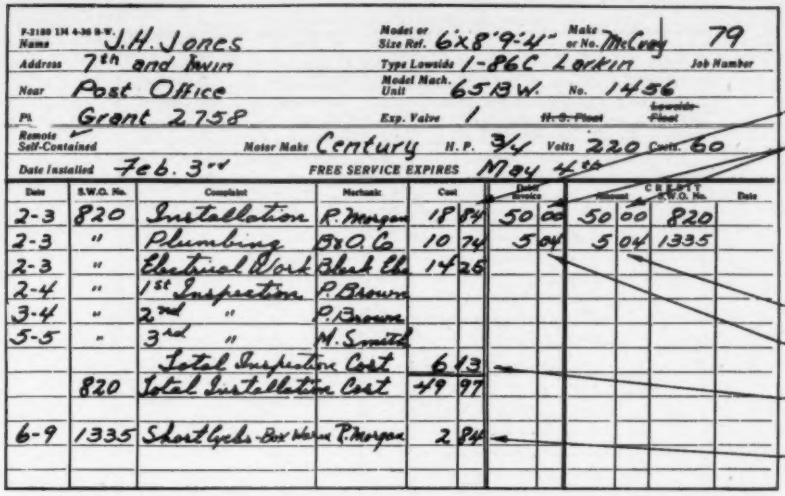
Fig. 3—Inspection sheet which is inserted as a fourth copy of the installation order when it is issued by the dispatcher. All other information on this form is filled out by the inspector making an inspection 24 hrs. after installation, 30 days and 90 days after installation. The total cost "C" is entered at C—Fig. 4.

mileage, and so forth, is shown on the reverse side of the installation order in triplicate.

When the installation order, filled out in full by the installation man, is turned back to the service dispatcher, the service dispatcher notes this on the Daily Service Call Record, Fig. 5, from which he has obtained the serial number for the installation order.

The installation order is costed in triplicate by the service department, the original and triplicate being retained in the service department, and the duplicate copy being sent on to the accounting department.

The installation cost is noted on the service and installation record card, as indicated in Fig. 4-A, and the original and triplicate



P-3180 1M 4-36 B-W	Name J.H. Jones		Model or Size Ref. 6x8'9-41"		Make or No. McCray		79						
	Address 7th and Irwin		Type Lowside 1-86C Larkin				Job Number						
	Near Post Office		Model Mech. Unit 6513W.		No. 1456								
	Ph. Grant 2758		Exp. Valve 1		H-S-Float		Lowside Float						
	Remote / Self-Contained		Motor Make Century		H.P. 3/4		Volts 220		Cycles 60				
	Date Installed Feb. 3rd		FREE SERVICE EXPIRES May 4th										
Date	S.W.O. No.	Complaint	Mechanic	Cost		Debit Invoice		CREDIT Amount		S.W.O. No.	Date		
2-3	820	Installation	R. Morgan	18	84	50	00	50	00	820			
2-3	"	Plumbing	B & O Co	10	74	5	04	5	04	1335			
2-3	"	Electrical Work	Shark Elec	14	26								
2-4	"	1st Inspection	P. Brown										
3-4	"	2nd "	P. Brown										
5-5	"	3rd "	M. Smith										
		Total Inspection Cost		6	13								
	820	Total Installation Cost		49	97								
6-9	1335	Short Gals - Bar Valve	P. Morgan	2	84								

A
B
F
E
C
D

Fig. 4—The service and installation record card heading is filled out from details obtained from the inspection sheet in Fig. 3, and a job number assigned to it. Installation costs are posted on the card and after 90 days the inspection or free service costs are tabulated and a total taken. The reverse side of the card is ruled so that additional service calls may be entered there. All service calls and their cost amount are entered on this card. The sales price is entered in debit invoice column whether or not the work was paid for as under Fig. 6.

A—is the installation cost as shown at A—Fig. 2.

B—is the amount charged the customer or allowed by the sales manager on the sales order for the installation and free service period. This amount is entered in the debit invoice column and again in the credit column when the amount is paid.

C—is the total inspection cost obtained from C—Fig. 3.

D—is the cost of the service call illustrated in Fig. 6 and the amount is taken from D—Fig. 6.

E—is the sales price of the work done under "D" and is entered in the debit invoice column immediately whether paid for or not. It is obtained from E—Fig. 6.

F—The sales price is credited to the customers account when cash is received or settlement is made in any other manner.

installation orders are filed in the job envelope assigned to that respective installation.

As the accounting department receives invoices from electrical and plumbing concerns performing the electrical work incidental to the machine unit installation, the service department is advised as to the amounts, and these are posted on the service and installation card as indicated in Fig. 4.

Inspection Sheet—Free Service Accounting

Experience dictates that the most satisfactory method to render service during the free service period is by the check-back, or inspection system. When the installation is completed, the first check-back, or inspection call, is to be made twenty-four hours after installation, the next thirty days after installation and the last inspection ninety days after installation.

As indicated in Fig. 3 the inspector is to check on the inspection sheet the various items that are necessary for him to investigate.

Each inspection call should be thorough and should be made with the purpose of anticipating and correcting any possible trouble. There is no reason why possible trouble cannot be identified and corrected during the inspection period, making further service unnecessary for some time to come.

When an inspection is made, the material used, the labor and the mileage is posted at the foot of the inspection sheet. It then is filed in such a manner that it will come to the notice of the service dispatcher at the date of the next inspection call.

DAILY SERVICE CALL RECORD SHEET — DATE

NAME	ADDRESS	S.W.O. No.	MECHANIC	COMPLAINT
F & B Market	163 Newhall	1330	P. Brown	Belt Slipping
Dofson Bros.	10th & Walnut	1331	M Smith	Boy Warm
Robinsons	223 E 2nd Street	1332	P. Brown	Will not Start
Kirby & Sons	Cherry & Ky	1333	P. Brown	Set too Cold
Merchants Mkt	6th & Rice	1334	M Lane	Installation
J H. Jones	Taft & Irwin	1335	P. Morgan	Short Cycles - Warm
		1336		
		1337		
		1338		
		1339		
		1340		
		1341		
		1342		
		1343		
		1344		

Fig. 5—The daily service call record sheet. Service calls as well as installations are recorded in order received on this sheet and a serviceman assigned to the work. Shop work order numbers shown in the center column originate on this sheet and are then transferred to the upper right hand corner of the service work order as shown in Fig. 6.

In the event service work other than is accomplished by the inspector is necessary during the free service period, a service work order is to be made out for this purpose and the material and labor used posted at cost on the installation and service record card. This cost is to be included in the total cost of the installation and free service.

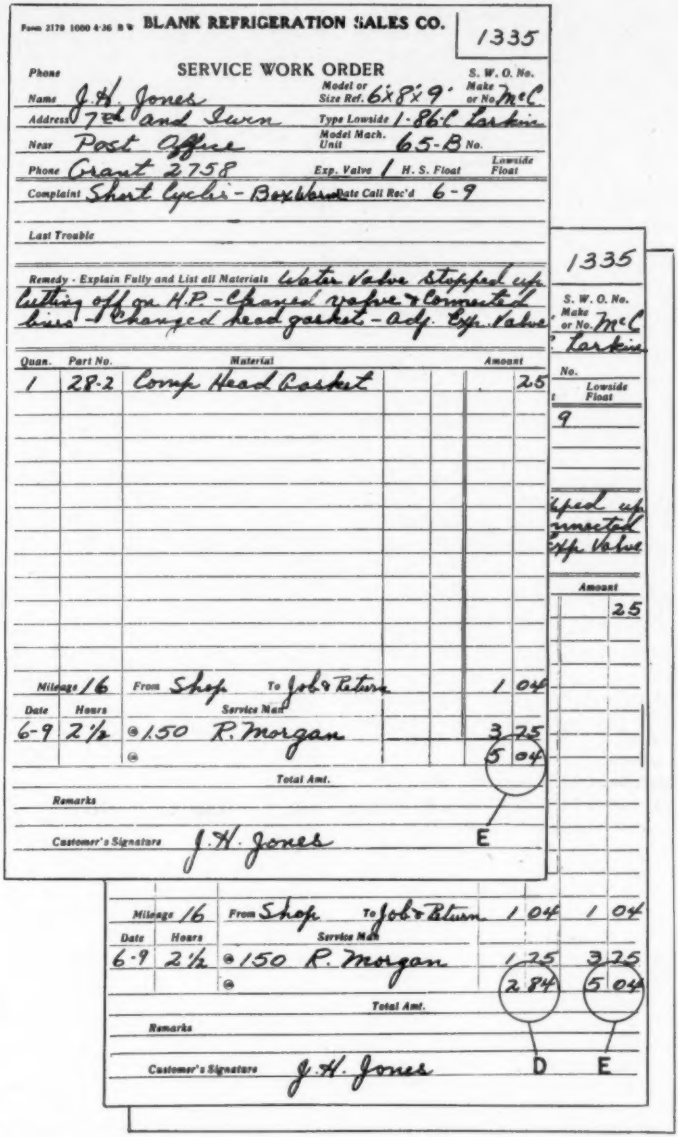
The Service Work Order—Charge Service Accounting

After the expiration of the free period, the service work order is to be used as illustrated in Fig. 6.

The service dispatcher has before him at all times a pad of daily service call record forms, Fig. 5. With a hand-numbering machine the service dispatcher stamps as many service work order numbers as service calls that may be expected on any one day. As calls are received, whether for service or installation, the name and address of the customer and the complaint made are posted.

When these calls are given out to service men the name of the service man assigned is posted on the daily service call report form and the service man is advised as to the service work order serial number.

By referring to the service and installation record card, the service dispatcher can give the service man information as to the nature of the last service call, which will enable the



BLANK REFRIGERATION SALES CO. 1335

SERVICE WORK ORDER

Phone
Name J. H. Jones
Address 7th and Irwin
Near Post Office
Phone Grant 2758
Complaint Short cycles - Box blows

Model or Size Ref. 6x8x9
Type Lowside 1-86-C
Model Mach. Unit 65-B
Exp. Valve / H. S. Float
Date Call Rec'd 6-9

S. W. O. No. 1335
Make or No. McC
Lowside Float

Last Trouble

Remedy - Explain Fully and List all Materials Water Valve Stopped up Cutting off on H.P. - Cleaned valve & Connected lines - Changed head gasket - Adj. Exp. Valve

Quan.	Part No.	Material	Amount
1	28-2	Comp Head Gasket	25

Mileage 16 From Shop To Job & Return 1 04

Date	Hours	Service Man		
6-9	2½	@ 150 R. Morgan	3	75
		@	5	04

Total Amt.

Remarks

Customer's Signature J. H. Jones

E

Mileage 16 From Shop To Job & Return 1 04 1 04

Date	Hours	Service Man		
6-9	2½	@ 150 R. Morgan	1 75	3 75
		@	2 84	5 04

Total Amt.

Remarks

Customer's Signature J. H. Jones

D E

Fig. 6—The service work order as used on service calls. This form is filled out either by the service dispatcher or service man and the shop work order number assigned as shown in Fig. 5. All information on the top of this form is obtained from the service and installation record card (Fig. 4). The original copy is the customer's copy serving as the invoice. The duplicate is the accounting department's copy, and the triplicate is the service department's copy. The customer is given the original copy if the work is paid for. This copy then serving as the service invoice and is receipted by the service man. If not paid for when work is completed it is mailed out as invoice by the accounting department. Cost prices, of course, are not shown on the customer's copy. The cost "D" is entered in D—Fig. 4, and the sales price "E" is entered in E—Fig. 4.

service man to anticipate the trouble experienced. In the event the call is a repetition of the previous complaint it will indicate the service man must make special effort to correct the cause.

When the work has been accomplished, it is most essential that the customer sign the service work order in triplicate. The original can be used as the customer's invoice. If it is desirable for the customer to pay for the work when accomplished, the service man can receipt the service work order in triplicate and leave the original copy with the customer.

In the event it is necessary to invoice the customer from the accounting department, the accounting department should keep the service department advised just when the invoice is paid so that the customer's account can be credited accordingly on the service and installation record card.

In either event, when the service man returns the service work orders to the service dispatcher the customer's account is charged in the column "Debit Invoice" in the sales amount of the Service work order.

Cost Amount of Work Order Posted in Cost Column

The cost amount of the service work order is posted in the "Cost" column in order that the service department can at any time arrive at an accounting of the cost of a specific installation as against the income derived.

When the accounting department advises the service department that the invoice has been paid, the service department posts a credit on the customer's installation and service record card, indicating at that time the serial number of the service work order on which the charge was made.

In some instances the sales department may consider it good business to perform service work on a no charge basis to the customer. In such instances the accounting department should charge the sales department with the amount involved and notify the service department. The customer's account can be credited accordingly so that the customer's installation and service record card will be in balance.

This is an important transaction, since it immediately places the burden of such sales policy adjustments on the sales department and relieves the service department of this expense. Such a policy credit to the customer should be identified by a prefix "P" or "S" (sales policy) or if such credit

Date	Order No.	Placed In Stock	Taken Out	Inventory Balance
3-2	6721	30		30
3-10	S.W.O.# 1031		1	29
4-15	SWO# 1139		1	28
6-9	SWO# 1335		1	27
Minimum	10	Maximum	30	
Part No.	28-2	Used On Model	Servel #1-2	

Fig. 7—Perpetual inventory card. All parts drawn from stock are entered on the perpetual inventory card. When "inventory balance" approximates "minimum" the part is to be reordered from the factory.

memos are in use, a credit memorandum number can be shown in the "amount" column of "Credit."

With a separate account set-up for sales policy adjustments, the distributor can in a very short time realize the extent of such adjustments and make corrections accordingly. Usually heretofore the service department has been accepting this burden which, after all, is not chargeable to service but to the promotion of sales, or, as before, sales policy.

Service Parts and Material Inventory

Realizing that it is possible for a considerable loss to occur if proper accounting is not made of parts and service material removed from stock the following recommendations are made as having proved to be the most practical by distributors and dealers in various parts of the country.

Where a small operation is involved, it is suggested that the service and installation men obtain parts and service material from the stock room on a stock room memorandum. After the service work orders are turned in by the respective service men the parts used can be checked from the stock room memorandum and the service men can be made to account for any balance presumably in their possession. At the time the parts used on the service or installation orders are checked against the stock room memorandum the perpetual inventory rec-

ord should be also balanced. A typical perpetual inventory tag is illustrated in Fig. 7.

It will not be necessary to have a stock room clerk to take care of the above transactions as this can be handled by the service dispatcher.

Where a distributor's stock and turnover is comparatively large, it is desirable to handle the dispensing of service parts and material to service men in a somewhat different manner.

The service men should be furnished with a definite inventory of parts and service material to take care of their average needs. Upon completion of a service call or installation the service man can place the triplicate copy of the service work order in a bin, one of which can be assigned to each service man. During the day when the service man is out on installation or service calls the stock room clerk or service dispatcher can reimburse the service man's inventory to the extent of material shown on the service work order in the service man's bin. This will keep the service man's inventory in balance and in the event it is necessary for him to requisition any additional material from the stock room other than appears in his inventory, should be shown as charged against him personally.

Disbursements are to be accounted for on the perpetual inventory tags in the same manner as outlined above. In the larger operations it is going to be more practical to have the perpetual inventory card filed in a kardex type file cabinet, whereas with the smaller dealer the perpetual inventory card can be attached or tacked to the bin containing the respective parts or material.

Service Stock Turnover

One of the important fundamentals in merchandising service parts is the control of service parts and materials turnover. In every instance a minimum and maximum requirement should be determined, based on the anticipated disbursements. The minimum amount should be based upon the quantity that will be sold during the period necessary to receive a freight shipment from the factory.

This is one of the major benefits derived from stock control as it allows the accumulation of orders for various parts and the shipping by freight rather than express, with the resulting savings.

The maximum amount should be limited to a possible three months requirement.

Assuming, for example, that the disbursements of a specific part average four per week and freight from the time the order is placed until the time the equipment is received averages three weeks, the very minimum requirement of that particular part would be twelve, and as indicated above the maximum would be limited to the three months' requirement of forty-eight. It is simply displaying good merchandising methods to watch the turnover in the service stock and materials in the same manner that other phases of the distributor's business are scrutinized. This will avoid stocking of large quantities of slow-moving items and carrying a large investment in service stores inventory.

Conclusion

It is acknowledged that the procedure outlined herein cannot be applied in its entirety to every organization, but it can form a nucleus of an accounting system that can be dove-tailed in with the existing accounting procedure.

The small two and three man independent service shop doing service and installation work only, may find it convenient to dispense wtih some of the forms shown here and to reduce the number of copies of the service work order form to two instead of three as shown in Figs. 2 and 6. Since there would be no separate accounting department in a small organization, there would be no need of the accounting department copy.

All information in the possession of the service department pertaining to a respective job is filed in a job file envelope. These envelopes should be about 11 x 14 inches and of strong paper. The job number shown in the upper corner of Fig. 4 is stamped on the upper right hand corner of the envelope. Envelopes are then filed numerically by job number.

WPB URGES USE OF FIELD OFFICES

THE War Production Board has again urged businessmen that whenever they wish to obtain information from WPB they should go to their regional or field offices before coming to Washington.

"We have 12 regional and 127 field offices scattered throughout the country," the announcement said. "They were established in order to save businessmen the trouble of coming to Washington, and also to prevent an overload of work in Washington."

Proposed Exchange of "Part for Part" in Refrigeration Business

By Harry Alter*

There are some plans being considered for the refrigeration industry following the pattern of the recent automobile repair order requiring the return of a "part for a part."

Already some refrigeration manufacturers and wholesalers have instituted this practice. The idea of the returned part, of course, is to build up a revolving pool of critical materials presumably for making new refrigeration parts.

There are two sides to every question, and in keeping with its policy, The Refrigeration Service Engineer presents the opinion of a large wholesaler of refrigeration on this subject.—Editor.

IN considering any WPB proposed order requiring that a defective refrigerator part be returned when purchasing a like part for replacement, the following facts peculiar to the refrigeration business should be carefully studied.

1. Refrigeration Service Is Performed Wherever the Machine Is Located

Unlike automobiles seldom are refrigerators repaired in the shop—nearly always on the job. Thus the service man first makes a diagnosis of the refrigerator and determines the nature of the fault. Let us say the machine is a Norge and needs a new shaft seal. It is very likely that the service man would not have the replacement seal in stock so must call at a supply jobber for it. This is always the case on orphan refrigerators like Zerozone, Majestic, Grunow, Copeland, Truscon, Dayton, etc., etc. Few repair shops carry parts (not even belts) for "orphans" in stock. Yet there are several hundred thousand orphan refrigerators in use. On other makes like Kelvinator, Norge, Crosley, Frigidaire, etc., etc., few independent service men carry replacement parts in stock because they never know what they will be called on to fix next. As a consequence they must stop at their supply jobber anyway so it is more economical for them to depend on the jobber and thus they carry as little stock as possible. This is generally true of service organizations of from only two men to twenty, of the type that do general repairing on all makes. Thus I contend that most refrigeration repair work is done in the home or store and that service companies carry little or no inventory of refrigeration replacement parts.

2. Refrigeration Repair Is Always Emergency Repair

In refrigeration servicing there always is an actual or impending breakdown—mostly during warm weather and invariably with danger of perishable food spoiling. Thus refrigeration service men have a list of calls to make each day, all of which are "rush" and important.

3. Refrigeration Breakdowns Vary Greatly

When a refrigeration repair shop receives a service call there is no way of knowing what the fault is until the machine is examined and tested. Sometimes he does not even know the make. There are a great many different things that can be wrong and the lay person owning the equipment can not possibly determine the trouble. There are highside faults too numerous to mention, and lowside faults like thermostat, or other control breakdowns that can only be ascertained by expert diagnosis. I contend that the service man answering the average call cannot carry with him the spare parts he might need because of the wide variance in such needs. The refrigeration supply jobber carries in stock from 4,000 to 8,000 different items for refrigeration repair purposes.

4. Why "Part For Part" Exchange Is Impractical in Refrigeration

Namely, returning the defective part in order to get a replacement.

* President, Harry Alter Co., Chicago.

A. Refrigerator Out of Service too Long

If the service man must turn in the defective part before obtaining a new replacement the refrigerator would be torn down until he could go to his supply jobber with the part and then return to the job with the replacement. In many instances the refrigerator might be giving some service so that food would not spoil while the service man was securing the parts needed for repair, as at present. I contend, therefore, that under a "part for part" exchange plan that refrigerators would be out of service much longer when undergoing repairs and loss by food spoilage much greater.

B. Greater Consumption of Gas and Tires

Obviously if the service man has to make extra trips to get spare parts because it is necessary to first remove the defective part before he can secure a replacement from his supply jobber, his consumption of gasoline and his tire wear will nearly double. In addition the cost of refrigeration service which is based on an hourly rate will increase greatly. This is not in harmony with anti-inflation measures. I contend that the salvage value of defective refrigeration parts is less than the cost of added gasoline consumed, irreplaceable tire wear, and extra service costs to the owner.

C. Refrigerator Owners in Smaller Towns Might Be Without Service for Several Days

Refrigeration supply jobbers are found only in the larger cities. Service men in smaller towns mail or phone in their orders. Thus because as stated in paragraph 1, service men can not carry large stocks, refrigerator owners in all cities not having a supply jobber would be without service until the service man could remove the defective part, send it in to the supply jobber, receive his replacement a day or two later and then make the final repair. I contend that under a part for part exchange, the public in the smaller towns would raise a great hue and cry over such discrimination, and their complaint would be justified.

D. More Unnecessary Shipping of Defective Parts on America's Already Over Taxed Facilities

When one thinks of the U. S. one must include the wide open spaces of 20 to 50 miles between towns, not just of the crowded East. In such remote places people live and own refrigerators. When a spare part is needed for some the local service man must mail or express the defective part back to the supply jobber in order to get replacement. Also the jobber must send by truck or freight, the defective parts he has collected from service men back to the various manufacturers of replacement parts in order to replenish his own stock. So again we are transporting tons of defective parts around the country needlessly and adding more tonnage to an already over loaded transportation system.

E. Every One Would Suffer with Unnecessary Higher Costs

The entire refrigeration industry would have added to present high costs of doing business the new added expense of handling, shipping, and accounting for defective parts if a "part for part" exchange plan was established. Service men would have higher costs, as would refrigeration supply jobbers and manufacturers.

F. Too High a Price for Salvage

If the object of a "part for part" exchange is to be sure that defective refrigerator parts are salvaged, added costs to the refrigeration industry, and to the public, makes the cost of same much too high. In fact, much higher than the salvage value of all the defective parts.

G. Small Salvage Per Dollar of Cost

Unique in refrigeration is the breakdown of cost of replacement parts. Things like Rotary Seals compressor parts, thermostats, expansion valves, and motor parts, have little scrap value in relation to their cost. The reason is that a "cold control" for instance which retails for from $6.00 to $8.00 weighs less than one pound; a Rotary Seal for a Frigidaire weighs only 5 oz., but retails for $2.90; all because while little material is used in these parts a great amount of fine precision labor, inspection, and test goes into them. I contend it is wasteful and not economical to use extra gas, tires, labor, parcel post or express transportation to return a defective Rotary Seal which weighs only 5 oz. through the entire refrigeration distributing channel until it gets back to the factory. The cost of sending this 5 oz. Rotary Seal would be roughly,

One hour service man's time going back and forth	$1.50
Postage from out of town (First Zone)	.11
Jobbers return and handling cost	.30
Factory cost of handling	.30
	$2.21

H. Parts Could Be Salvaged Locally

If salvage of defective parts is the object of "part for part" exchange, the local service man installing the replacement part can be held responsible for salvaging the defective part. This is done in the automobile repair business. A simple regulation issued by WPB could easily provide for this type of salvage or scrapping of defective parts, making it obligatory for the service man to collect and salvage all defective parts and at no extra cost to anyone.

I. If Anti-Hoarding Is the Object—

If the object of "part for part" exchange is to prevent hoarding of refrigeration parts, that idea should be dismissed altogether. First Supplier's Limitation Order L-63 prevents supply jobbers from carrying too large an inventory so that order effectively prevents hoarding by jobbers. Hoarding by service men is not done because as noted in paragraph 3, the service man does not know what part he will need until an actual breakdown occurs. His training, experience, and desire prompts him not to carry any inventory, but to depend on his supply jobber. Thus I contend that the danger of hoarding on the part of the service man is negligible and on the part of the supply jobber is controlled by L-63.

5. Finally.

Part for Part Exchange may be suited to other lines, but as for refrigeration repair parts I think I have proved it is entirely unsuited. My opinion is based on actual experience in refrigeration service and sales since 1930 and in supplying replacement parts for all makes of refrigerators to over 20,000 service organizations since 1934.

R.M.C. Conducts Training Course for Men and Women

FEELING the shortage of man power because of the war, the Refrigeration Maintenance Corp., service operators in the city of Cleveland, have taken the initiative and organized a training school for both men and women. Mr. Farr, president of Refrigeration Maintenance Corp., has long felt that there is a place in appliance repair for women, as well as men. With this thought in mind, an advertisement was inserted in one of the local papers stating that free training, in appliance repair, was available for both men and women with attractive positions in view, for those who qualified. The response was immediate and amazing in that so many applications for the course were received; in fact the number was so great that it was possible to accept only approximately one-half of the applicants.

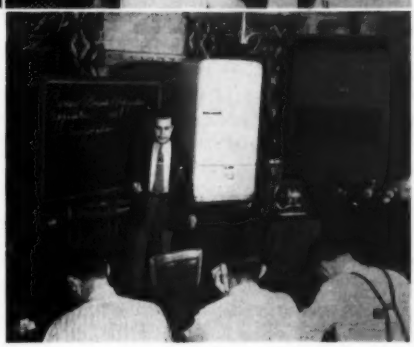
It was interesting to note the types of persons eager to get into this type of work. Many of the applicants were switch board operators, house wives, secretaries, and appliance demonstrators; also included were men well qualified, but who were unemployed because the nature of their particular work was not suited to the war effort. Applicants who were directly connected with defense industries were not accepted. The course opened Monday evening at the Carter Hotel, in Cleveland, with an attendance of 54, approximately one-half of which were women. The class was conducted for 2½ hour periods each evening throughout the week.

Realizing that the applicants had little, or no knowledge of repair work, the entire week was devoted to the elementary principles and theories upon which refrigeration is based. Demonstrations were given of the characteristics of the various refrigerants used in refrigeration mechanisms, and the parts of the refrigeration apparatus were displayed and demonstrated. The intent with which the students followed the course was outstanding. It was to be expected that after the course got underway certain students would discover the course not to their liking and would drop out of the classes. On the contrary, all of the students attending the class displayed an amazing

interest and determination to become familiar with this type of work, and by the end of the week the class was practically as large as at the start.

Refrigeration Maintenance Corp., who are the authorized service agency for Norge Appliances in the city of Cleveland, secured the cooperation of the Norge National Service Division in presenting the school. The Norge Corp. supplied various display boards particularly designed for this type of work and also furnished an instructor, Mr. E. H. Dayton, who has held service schools for Norge for a number of years.

The week of training on basic principles was followed by a week of actual shop practice on refrigerating machines for trainees selected because of their aptitude. During the week of shop practice the students actually used the tools and performed the various service operations under the constant guidance of the instructor.



VIEWS OF THE CLASS AND ITS INSTRUCTORS

1. J. R. Cameron, National Service Manager of Norge Division, Borg-Warner Corporation, explains the vital part refrigeration plays in the present war effort.
2. A partial view of the trainees, whose attention is fixed on an explanation of the refrigeration theory.
3. Warren W. Farr, president of Refrigeration Maintenance Corporation, closes the first night's session.
4. E. H. Dayton, National Service Division of Norge, explains the function of the cooling unit.
5. E. H. Dayton, instructor, asks the class to copy notes from the blackboard.

COMMERCIAL

INCREASE BUSINESS BY DOING A MORE EFFECTIVE JOB OF SELLING *Selling*

Hardware Store Expects $10,000 Gross with Service Department

By Robert Latimer

THE war-time field which is most logically within the service firm's scope is combined air conditioning, domestic and commercial refrigeration service, according to Edward Riehle, president of the Handy Hardware Company, Richmond Heights, Missouri. "Since no new refrigerators are going to be manufactured, and every housewife is fully sold on conservation so far as major appliances go, the refrigeration service field is bound to expand substantially during the next year," Mr. Riehle said. "So that we conservatively estimate that we will gross $10,000 a year in this department as against an average of $7,000 a year for the past three."

Handy Hardware Company, which is a typical "neighborhood" hardware store serving Richmond Heights, Clayton, and other suburbs of St. Louis, has maintained its refrigeration service department for eight years. A completely-equipped shop at the rear of the store is now being expanded for the future. Mr. Riehle, whose hardware stocks include everything found in the average hardware store with a special gardening department and an unpainted furniture department, was at one time a Frigidaire factory man himself, and has built up his own refrigeration service business on the basis that the hardware store, selling 90 per cent merchandise for the home anyway, is ideally set up for this type of repair work.

Two veteran service men are on the payroll at Handy Hardware Company, and can turn out from two to five refrigerators a day if necessary. "We built up the department almost without advertising," Mr. Riehle said. "Although we do use a two-inch space in the classified section of the telephone directory, 95 per cent of our business comes from our hardware customers who are refrigerator owners, and get an opportunity to learn about our methods while shopping for hardware. We are exceptionally well known in our section and have never found it necessary to use bargain rates, premiums, or any form of ballyhoo advertising to get the calls we wish. When we first set up the department, we sent out 4,000 penny post cards to every name on the hardware store list, but we haven't spent a cent for advertising since."

Shop equipment, much of which Mr. Riehle designed himself, consists of a complete paint-spray booth for enamel finish-

ing, an oven for baking finish, charging pressure equipment for refrigerative fluids, a small lathe, grinders, and pressure tools for refrigeration compressor work. The shop is laid out on a "mass production scale." Formerly, the Handy Hardware store did a profitable business in reconditioning of used refrigerators—but this market is no longer possible now that no new units are going on the market.

"We do about 65 per cent of a volume in domestic service," Mr. Riehle said, "making standard charges for all repairs from minor adjustments to complete overhaul. We have a minimum rate of $1.50 which covers the first half hour and handling cost, and $2.00 an hour afterwards. We try to stay within three or four miles of the store, using a converted Chevrolet sedan as a small truck for hauling parts and heavy tools. If a major overhaul is contemplated, we use a transfer company to pick up and deliver the box. Our rates are the same as commercial refrigeration service firms, and are well accepted simply because we do a good reconditioning job and give a 90-day guarantee."

Another 20 per cent of the $7,000 yearly volume has been in commercial service—consisting of larger-scale refrigeration service for drugstores, ice cream parlors, restaurants, markets, and other users. Mr. Riehle does not go after this business heavily, since it is highly competitive, but most of the commercial customers on the list are his personal friends, who buy other merchandise in the hardware store. The same rates are charged. Also, Handy Hardware Company has a "specialty department" which handles apartment refrigeration service—repairs to the old-fashioned multiple systems using one compressor for all boxes, or individual appliances in the building. No contract, whereby the firm contracts to make all repairs at a flat yearly rate, are accepted—the firm taking every call on an individual basis. "There are not many multiple systems left," Mr. Riehle said. "But we have found it a profitable market in quick-service for those which are. Otherwise, the individual boxes are simply domestic service as in the home."

One of the two men in the shop is a qualified air conditioning expert—therefore Handy Hardware Company also advertises air conditioning service. This consists of anything from spun-glass filter cleaning to compressor overhauls, and more specifically, renovation service on room coolers. The store has an arrangement to service about 40 of the small one-and-a-half ton units, and has sold many of them itself. "This is closely allied to refrigeration repairs," Mr. Riehle said. "And I believe we are the only firm with a department specifically for room coolers. The work is not difficult, a higher rate can be charged, and we have not found a great deal of competition." When the war program stopped the sale of new refrigerators, Mr. Riehle planned to open up a large used-box department—but has given this up since price control regulations have made used boxes unprofitable. Formerly, the $20 box could be overhauled for $25, and sold from $60 to $75 with approximately a 22 per cent profit. Now, with the government enforcing tight price control, it is impossible to extract a worthwhile profit from this field—and attention has been transferred to service.

Keep Service Organization Small

"My advice to the hardware dealer going into this business is to keep his service organization small," Mr. Riehle said. "If the dealer attempts to build up too large a staff, and increase his overhead, unexpected expense can quickly eat up all profit. Our two-man crew is large enough to handle the volume the year around, and we intend to keep it at that size as long as possible."

Does refrigeration service help the hardware business? "Yes," Mr. Riehle says. "Our service customers are largely the same people who purchase hardware. We make a point of telling every refrigerator-owning hardware customer about our service, even taking them into the shop to see some of the work done. On the other hand, we tell every refrigeration service customer that we are a hardware store, and spend part of the time in the house looking for hardware markets."

Special Training Methods Help Denver Refrigeration Service Firm Overcome Help Problem

By Herbert Hanley

IT will require considerable ingenuity and short cuts on the part of the refrigeration service firm to successfully put an end to the labor problem, according to George H. Gorman, head of the A to Z Refrigeration Service Company of Denver, Colorado.

The Gorman organization, one of Denver's oldest refrigeration service companies, like many other such commercial-and-domestic services has been "hard hit" by the loss of experienced mechanics and service men to the army—both via induction and government employment. Several men were lost by the unusual action of the government in listing off experienced mechanics in the Denver area, and then visiting them one by one with the offer of high-pay defense-construction or maintenance work.

In July, Mr. Gorman was 250 calls behind, and could use easily from 5 to 8 more men if they could be obtained. Calls from commercial refrigeration users as well as domestic refrigerator owners were piling in at the rate of four and five per day more than could be handled even with overtime work and eight men on the crew. Only five mechanics were available at the end of the month, according to Mr. Gorman. "We have experienced a peak volume which will certainly grow larger as refrigeration equipment wears out or needs repairs," he pointed out, "and expect volume to grow steadily for at least two years, after which it may drop down a little. The only logical means of meeting this situation will be either establishment of more service firms, or the training rapidly of extra men who can be depended upon to stay with the firm."

The labor problem has been partially solved by the "pooling" of some business among cooperative refrigeration service organizations in Denver—many of whom have set up arrangements whereby the work which cannot be handled by one can be taken over by another, or large-scale work parceled out cooperatively among several friendly firms. A lot of the competitive nature of the business has gone by the board since the war began, Mr. Gorman emphasized. "We're glad to turn over work which must be done and which is beyond our capacity to another dealer," he explained. "But even this idea hasn't been enough to take care of the oversupply of calls. We have had occasion after occasion when telephone calls to other firms revealed them all up to capacity in their own work—and we had to move up the job to some later time when a man would be free." Some eight service firms are now attempting to keep in touch with each other's ability to take over excess work.

Older Men Preferred

More practical solution has come from the training of new men to take the place of the half-dozen or more lost by A to Z Refrigeration Service Company to the army and other work. Mr. Gorman, since the beginning of the emergency, has been attempting to hire younger men, or those with some physical deficiency which will keep them from military service without interfering with their ability to work. Men partially crippled or troubled with bad eyesight, etc., are reasonably sure to be exempted from service, and surprisingly,

learn much faster. "I prefer older men not only because of their military exemption, but because they want to learn and use their knowledge," Mr. Gorman pointed out. "Men 35, 40 and 45 are more serious about the job, are willing to tackle the tough work of refrigeration service with more patience, and can figure costs and time more accurately. It requires two years to make a good serviceman, more with younger men, and a lot of the latter are primarily interested in payday, or are nonchalant about their work believing they will be in uniform shortly anyhow."

Despite the heavy volume of work flowing in, Mr. Gorman is now spending all his time in the office in East Denver—training new men in the above classification as rapidly as possible. Formerly he was out on the service backlog with his men; but now finds it much more important to solve the personnel problem for the even-busier future ahead. "We start our new men slowly," he said, "giving them such simple jobs as changing motors, pulling out compressors, installing valves or tubing, in the shop, and sending them out with more experienced men for practical experience. The helper system is the quickest way to teach a new man the constantly-different requirements of refrigeration service. Therefore, I'm going to spend a year, if necessary, training additional help."

Competitive Service No Help

Mr. Gorman doesn't believe that opening up of competitive new refrigeration service firms will amount to much, or help to alleviate the situation. "Appliance dealers turning to service work are finding it impossible to obtain necessary machines and parts, let alone the men to do the work," he pointed out. "One of our largest appliance dealers has been advertising on a national scale to obtain eight men, and has had only a few replies which didn't pan out. I think this situation will continue to the point that the established service firm will have to keep up all its regular business and a lot more besides."

A to Z Refrigeration Service Company is well fortified for business through a number of special services, including installation of direct-draw and other beer-tap refrigeration in scores of Denver beer taverns, multiple apartment house refrigeration, an air conditioning specialist, and large scale commercial work. A sign is put up on every job notifying the public that A to Z is doing the work.

Approximately 60 per cent of the firm's volume is now commercial, although it began with domestic refrigerator work, and its only advertising has been a large telephone directory ad which has been used continuously for more than ten years.

Unusual Conditioning Job for St. Louis Jewelry Store

ONE of the most unusual air conditioning systems ever installed went into the Mermod Jaccard King's Jewelry Store, St. Louis, recently, when eight five-ton package units which cool relatively small "spots" throughout the store were installed.

"Spot cooling" whereby small zones of 400 to 1,500 sq. ft. are conditioned, was necessary because one side of the store opens upon a large non-air conditioned department store street floor—it being impossible to close up this large leakage area, as much of the store's traffic is diverted from department store customers. Consequently, the eight York package units are responsible for small spaces around the floor, providing "blanket cooling" which makes it comfortable for the customer, although people passing along an aisle a few feet away cannot notice it. The package units are concealed behind the woodwork in the stationery, cosmetics, gift, diamond, and costume jewelry departments, with from 10 to 40 ft. of duct work radiating out from each. That serving the Gift Shop runs along the front of a mezzanine balcony, and ducts for the costume jewelry section are concealed beneath display cases along the aisle. Return grilles are at the floor or baseboard in each department, so that the average department customer is in between outlet grilles and return grilles—thus getting maximum benefit from the cooled air.

Denver Dealer Sells "Checkup Service" to Increase Profit-per-Call

By Donald Delayen

IN a highly competitive refrigeration service field, one of the most important considerations of all is the amount of profit possible per call, according to Herbert Names, head of Herb Names, Inc., refrigeration service organization of Denver, Colorado. "When many dealers begin scrambling for service work to replace volume from sales and installation work, there is bound to be a certain amount of price-cutting and sliding rates which will make it difficult to show the proper profit per call," Mr. Names explained, "and consequently, if the refrigeration dealer can develop a plan to make the most of each call, he will be better off from every standpoint."

The Names organization, which at one time was a large commercial and domestic appliance dealership and which switched to service when war clouds began to appear, has worked out a clever plan which Mr. Names recommends enthusiastically to all dealers taking domestic work of any kind. This is a fifteen-point checkup service which can be "sold" to housewives after the initial repairs have been made to her refrigerator, and which adds another $1.35 to the profit possible per call. It covers also commercial refrigeration, small appliances and all work done by the firm.

The fifteen-point checkup is part of a plan whereby Mr. Names believes it easily possible to eliminate all "dead weight calls"—those in which the customer decides not to have the work done after a serviceman has put in valuable time inspecting her refrigerator. Since March, any customer telephoning into the downtown Names shop is told that there is a minimum charge of $2.50 applied for every call—whether the serviceman merely inspects the box or spends an hour repairing it. The charge is graduated from $2.50 for the first hour through 85c per 20 minutes thereafter when exhaustive work is concerned; and is frankly explained to each customer. A few of course refuse to accept these terms and hang up to try elsewhere. "We're willing to lose a few such people in order to make certain that every call returns a profit or at least a small overage," Mr. Names said. "And have found that because minimum charges are now being applied by radio service shops, public utility service departments, etc., the customer is now usually resigned to the minimum and willing to accept it." Incidentally, Mr. Names established his prevailing prices several weeks before the period set for price ceilings in Denver; thus can continue his charges without trouble from the OPA or other price-control agencies.

Once the serviceman completes a repair job in the customer's home within the first hour, his responsibility is to then offer the Names fifteen-point checkup service—in which fifteen parts of the box (exclusive of whatever has already been repaired) are inspected, adjusted, and put in perfect order. Points included are:

1. Check cycle.
2. Condenser.
3. Belt for glaze, wear.
4. Door gasket for leakage.
5. Seal.
6. Fluid and pressure.
7. Expansion valve.
8. Hardware and trim.
9. Fan, if any.
10. Interior hardware.
11. Motor efficiency.
12. Wiring.
13. Coil.
14. Switch.
15. Defroster controls.

Since almost any housewife is 100 per cent conservation-minded in today's war conditions, it hasn't been difficult to sell this flat-rate $3.85 service inspection to most women Mr. Names said, and in fact, many since have telephoned in and asked for it when nothing was obviously wrong with their refrigerators. The $1.35 thus added to the average job goes a long way toward meeting the heavy expenses of a downtown location, paying salaries commensurate with or better than are paid in government-operated munitions plants near Denver, and continuing advertising programs. Mr. Names feels that as refrigerators continue to run without replacement, the market for service will continue to expand—and his flat rate checkup will become especially attractive for Denver home owners.

St. Louis Refrigeration Supply Jobber Takes Steps to Balance Deliveries

By Bert Merrill

REFRIGERATION supply dealers worrying about the fact that they cannot make deliveries of merchandise they have one, two and three orders for can take a tip from Authorized Refrigerator Parts Company, St. Louis, and develop a "Balanced" sales program which guards against the tendency of the dealer to "stock up" on parts.

Like dozens of other supply firms, Authorized Refrigerator Parts Company which is operated by H. F. Brockgeitens, I. W. Kreuger and H. D. Ayres, is experiencing considerable difficulty in obtaining replacements for stock sold, to the point that the company has tightened up on credit, and looks every unusual order over carefully before filling it. "Dealers are prone to become excited over the government reduction on manufacturing of parts and appliances," Brockgeitens explained, "and to order ahead for reconditioning and service work for several months. Although we naturally like to get the business, we can't afford to sell ourselves out and lose the goodwill of the later customer who needs parts badly and finds we can't supply him. Consequently, we are taking the stand of discouraging too large orders, and investigating any we receive which appears out of balance with the ordinary requirements of the dealer."

Since the first of July, when the situation became difficult, all orders coming into the Authorized Parts firm in St. Louis have been carefully gone over in relation to past sales to the same firm. If investigation of the files shows that the dealer who wants 50 expansion valves, etc., has ordinarily ordered only five, Brockgeitens or one of his two partners immediately makes a personal call on the dealer to see whether or not he can't get by with less. Using a good deal of diplomacy, of course, the St. Louis supply firm points out that it appreciates the business, but has a great number of other dealers to consider before filling so large an order. In many cases investigation of this type reveals that the dealer has landed a large defense or industrial order, whereupon he immediately gets priority delivery, but in the event that he is simply ordering ahead to protect himself against price increases or parts shortages, the firm courteously informs him that it cannot fill the entire order.

"We don't make an issue of this, but simply explain the facts and appeal to the dealer's sense of fairness to understand why it is difficult for us to jeopardize our inventory," Brockgeitens adds. "Usually they are willing to admit that our viewpoint is correct and are willing to rescind part of the order."

A message
TO ALL WHO SELL AND USE
"FREON-12"

A CYLINDER SHORTAGE IS AVOIDABLE

With your immediate help we will be able to meet your orders for civilian needs

YOUR COOPERATION

Cylinders adequate, if returned—
The bright side of the picture is the

A 4-POINT PROGRAM
To Prevent a Cylinder Shortage and Insure Adequate Deliveries

1. **CHECK RECORDS NOW** *and find out who has cylinders in which you sold "Freon" this year.*

2. **TELEPHONE** *every customer who has "Freon" cylinders and urge him to return his empties at once.*

3. **SEND TRUCKS** *to bring in cylinders not otherwise obtainable.*

orders for civilian needs

YOUR COOPERATION IN THIS PROGRAM IS NEEDED NOW—

There is no shortage of "Freon-12" but *an acute shortage of "Freon" cylinders is imminent.* In this statement we explain why this shortage threatens and how you can prevent it.

No steel for new cylinders—The steel shortage is acute as evidenced by numerous limitation orders of the War Production Board. As a result, manufacturers of the type of steel cylinders used for refrigerants are only able to make deliveries on orders rated AA-1 and AA-2. If you have followed the priority situation, you know that it is practically impossible to obtain these high ratings for any materials for civilian needs. Thus, new cylinders for refrigerants are out of the picture.

Cylinders adequate, if returned—The bright side of the picture is the fact that there are enough "Freon" cylinders in *existence* to meet civilian needs *if you see that empty cylinders are returned promptly.*

Unfortunately many sellers and users of "Freon-12" have not returned cylinders as promptly as they should. To forestall the threatened shortage we appeal to you to assist in carrying out the program outlined in the box at the right.

What This Means to You

It's a patriotic duty of every reseller and user of "Freon-12" to get these empty cylinders back. By making one cylinder do the work of two you release steel for bombs, tanks and other armament needed to fight the Axis. Furthermore, cylinders help maintain this nation's health with refrigeration they make possible.

Avoids stricter regulation—There have been rumors that WPB would have to resort to unusual methods of allocation. This need not be necessary if each reseller and user makes a drive now to return empties.

Helps assure your supply—There is no lack of plant capacity or of raw materials for making "Freon-12." You and we, by working together, can lick this situation. Your efforts will be appreciated and reflected by prompt deliveries of "Freon-12" to you and your customers.

who has "Freon" cylinders and urge him to return his empties at once.

3. **SEND TRUCKS** *to bring in cylinders not otherwise obtainable.*

4. **SHIP EMPTIES** *to Kinetic Chemicals, Inc., Carneys Point, N. J.*

KINETIC

FREON

REG. U. S. PAT. OFF.

safe refrigerants

"Freon" is Kinetic's registered trademark for its fluorine refrigerants.

Cleaning Air Filters Pays Big Dividends

Kansas City Refrigeration Firm Points the Way to Profit and Savings With Low-Cost Filter Cleaning Service

Temperature Engineering Corp. Explains How Any Refrigeration Engineering Company Can Add Air Filter Cleaning to Their Operation with Small Initial and Maintenance Outlay.

By B. K. Anderson

"FRANKLY how profitable is it for the refrigeration service firm to add air filter cleaning to its operations as a side-line?"

This is the question we asked R. E. Meeker, manager, Temperature Engineering Corp., Fourteenth and McGee Streets, Kansas City, Missouri. For the past three years Mr. Meeker's firm has done a volume averaging 50 units a day of this work.

"It's highly profitable," he answered, "Provided the firm that adds this side-line makes sure first it knows how to do the cleaning, and secondly that its policy is such that it can attract business from both new customers and from customers who have used laundries and such other types of business in the past.

"It must be remembered that a great number of persons who own air conditioning, cooling, heating and ventilating systems do not know that these cleaners can be cleaned, that they must be cleaned at regular intervals to provide the efficiency necessary from them and that a stopped-up or dust laden filter will greatly hinder the work of any air conditioning system."

From Mr. Meeker's advice it is easy to see that the logical firm to clean these filters is the refrigeration service firm in that they are the firm charged with efficient operation of the customer's unit. And also he is convinced that this cleaning need not be considered as anything more than a side-line in rounding out the company's complete refrigeration service.

Frank to admit that his company learned this operation the hard way, he says, "Actually we are an air conditioning, cooling and heating contracting and service company. When we started into the business we were told by the filter manufacturers that there was no satisfactory way to clean the filters, that they had to be replaced with new. But, after spending about a thousand dollars in an attempt to prove these manufacturers wrong, we have developed a system that puts the filters in exactly the same condition as they were when new."

Just what this system is, how it works and what it does follows in outline below:

Most failures in cleaning the spun glass cleaners have resulted from the fact that the cleaners are made in fiber or cardboard frame which, when unprotected in the washing solutions in the past, have collapsed, thus metal frames must protect the cleaners while they are being renovated.

These are the specifications: Filters shall be framed with galvanized iron designed to cover cardboard frames of the original filter. Frame shall be made of 22 gauge iron, and shall be formed in one piece with suitable clamp for locking in place. Dimensions of framed filter shall be such as to fit properly in standard filter retaining racks for nominal size of original filter units.

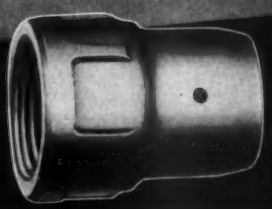
Next to take as much of the work as possible off the washing solution the filters should be subjected to a lint removal process. Large particles of fiber and lint are removed with vacuum cleaning unit at such velocity that it will not injure filter material.

Formula for VICTORY!

Superiority on land, sea and air is necessary for an allied victory. Here at the plant of the Mueller Brass Co. every special skill and facility that we possess has been turned to the one main essential purpose of winning the battle of production. THAT IS OUR FORMULA FOR VICTORY.

When the war has been won and our domestic markets are restored to us, our facilities will again be devoted to supplying, among other quality brass and copper products, STREAMLINE pipe and fittings for plumbing, heating, air conditioning and refrigeration use.

We know that the going now is tough for many of our former good customers. There are many restrictions to practically all available business. If you have a problem, we'll try to help. Write us. We'll appreciate it.



STREAMLINE
PIPE AND FITTINGS DIVISION
MUELLER BRASS CO.
PORT HURON, MICHIGAN

WINNERS OF NAVY "E" AWARD

Then comes the actual washing. Dust and dirt are removed in washing by dissolving original adhesive in mild solution having a tri-sodium phosphate base. Care is taken in this operation not to injure filter mat or cause filter material to become brittled.

Rinsing follows and is continued until the cleaning solution is completely removed from the filter. Clean water only is used for rinsing, after which the filters are placed in draining racks to allow surplus water to drain out of the filter before drying.

Drying is one of the most important operations of the cleaning. After draining the filters are placed in a mechanical drying chamber supplied with approximately 120° F. air in motion, using enough fresh air to carry away water vapor. The drying chamber is provided with suitable odor eliminating and sterilizing unit. The purpose of this drying is to prepare fibers for dust catching adhesive and to prevent molding of original cardboard frame under steel frame.

Spraying of Filter

And the final important point in the cleaning is the spraying of the filter with oil or adhesive to renew its dust catching ability. Mr. Meeker's instructions in this case are:

"Filters shall be treated with dust catching adhesive by spraying thoroughly both sides of the filter in the wind tunnel as air is drawn through the filter so that adhesive shall penetrate mat. This adhesive to be of such a nature that it cannot be readily ignited by match or other flame held against the filter. Viscosity of adhesive shall be substantially uniform from —15° F. to 300° F. Adhesive shall have negligible evaporation and shall not blow off into the air stream. Adhesive shall be of approved color to readily show dirt."

Now that the cleaner is ready to go back to the customer it must be properly identified. For this purpose a label that indicates direction of air flow, date cleaned and the company that did the cleaning is attached.

Because Temperature Engineering Corporation has specialized largely in commercial types of customers, such as offices, stores, theatres, schools, hotels, and restaurants, and other industrial types of firms, they have kept their service low-cost by reducing delivery and other expenses common to widespread operations. Although Mr. Meeker's firm has sought the volume type of customers, they do not make any allowance or discounts for volume. The average price for filter cleaning is 50 cents each, with other conditions sometimes affecting this price.

The firm keeps on hand 500 lender filters which are loaned free of charge to the customer while his filters are being cleaned, thus ridding the company of the necessity of rushing the cleaners back to the customer—bringing about a savings in delivery and preventing shop overload as well as keeping the customer's unit in operation during the filter cleaning period.

As to expense of the equipment used by Temperature Engineering Corp. in this operation, Mr. Meeker estimates the value to be around $500, but points out that most of this equipment is that common to refrigeration service shops.

Steel Cleaning Tank

The open steel cleaning tank used by this company is 12x3x3 feet. After being vacuum cleaned, the filters are put in this tank and allowed to stay overnight or about 12 hours, they are then rinsed for about 4 minutes in clear water and put into an oven for 5 to 6 hours to thoroughly dry. Spraying of the filters is done in the blower.

Since this service has developed such a large source of income for them, one shop man does this work and very little else. One of the most important things he must check for is to make sure that the filters are thoroughly cleaned and odorless.

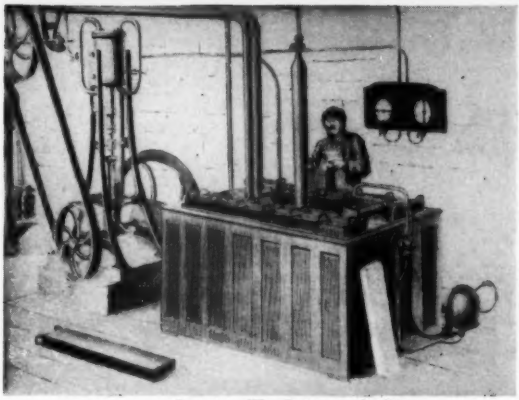
Little advertising support is given the side-line. Most used in this connection is a folder which explains the service and is regularly circulated to the prospects. However, every time a service man goes on a call he suggests this service to that customer. In Mr. Meeker's opinion, "Selling filter cleaning is largely a matter of educating the customer to the fact that the filters can be cleaned. Most of them do not know that this service is available.

"Keeping the business, once it is established, is a matter of being sure the filters are properly rinsed and odorless, that they present a clear appearance when held up to light and that they are properly conditioned by not having the washing solutions either too cold or warm, since both conditions will produce a murky appearance.

"Because of local conditions, many of our customers must have their filters cleaned once every two weeks, while the majority of them can go for much longer periods."

It is also Mr. Meeker's opinion that the vast majority of refrigeration service shops

REFRIGERATION HAS COME A LONG WAY



Courtesy The Bettman Archive

1877 Raoul P. Pictet (1846 — 1929), Swiss Physicist and Engineer, devoted his energies to the study of the critical temperature and liquefaction of gases. Although his work was only a beginning in this new field, it was of great importance and stamped him as a pioneer in Mechanical Refrigeration. In our present-day refrigeration we see the results of Pictet's experiments in the continuous cycle of liquefaction and evaporation of gases.

1942 We pay tribute to Raoul Pictet, whose brilliant work has added to the store of scientific data upon which modern refrigeration is based. Today, perishable foods and other necessities so vital to military needs and everyday living are transported to all corners of the world in refrigerated compartments of ships.

Since 1899, the Virginia Smelting Co. has kept pace with each new development and has maintained the high quality and standards for which Virginia Refrigerants are famous. Continued dependability is our contribution to America's certain March to Victory.

General View of Manufacturing Plant at West Norfolk, Virginia

"VIRGINIA" REFRIGERANTS

AGENTS FOR KINETIC'S "FREON-12"

VIRGINIA SMELTING CO.

WEST NORFOLK, VIRGINIA

have all the equipment they need to clean the filters with the exception of the metal frames. These frames can be purchased for $25.00 a hundred in Kansas City. Except for firms in the immediate Kansas City area, Temperature Engineering Corp., Mr. Meeker reports, has always helped other refrigeration companies secure the frames and given them what other advice possible in getting this operation started in their own areas, when these companies requested it and when he was sure they would not be used in a competing market.

Any inquiries in this connection may be addressed to: Mr. R. E. Meeker, Manager, Temperature Engineering Corp., Fourteenth and McGee Streets, Kansas City, Missouri. However, Mr. Meeker points out that his firm is flooded with business at the present time, and persons making inquiries should not expect a rapid answer.

"Because manufacture of new filters is like the manufacture of any other product, I believe that 'for the duration' service companies that can lighten this non-war maunfacturing load by such operations as this filter cleaning service, and in doing so will make a definite contribution to the war effort," he says.

LOS ANGELES REVISES REFRIGERATION CODE

PROVISIONS for compulsory qualifying examinations for refrigeration contractors, installers and journeymen installers, with certificates of competency issued only to those passing the tests, are being incorporated in the Refrigeration Code of the City of Los Angeles, Calif., revision of which is now under way under the direction of A. B. Wicks, head of the Heating, Ventilation and Refrigeration Division of the Municipal Building and Safety Department.

The code revision, according to Mr. Wicks, is aimed at streamlining and modernizing existing regulations and deletion of obsolete sections. Most important change will be the requirement for examinations to determine the ability of contractors and installers properly to perform the work. Examination and certification fees will vary according to the status of the applicant as a contractor, installer or journeyman.

Basically, the proposed new provisions in the refrigeration code are to be similar to the regulations placed in effect recently in Los Angeles for qualifying examinations and registration fees for heating contractors, installers and journeymen. The new regulations will affect approximately 200 refrigeration contractors and about 400 installers and helpers, but will not be applicable to refrigeration operating engineers.

The revised code is expected to be ready for consideration by the Building and Safety Department about November 15.

A NEW USE FOR REFRIGERATION

SHOCKLESS amputation, accomplished by chilling a leg or arm through mechanical refrigeration, may become one of the outstanding medical contributions of the present war, according to Dr. Lyman Weeks Crossman, senior attending surgeon at New York City Hospital.

The technique, developed by Dr. Crossman and Dr. Frederick M. Allen, of the New York Polyclinic Medical Hospital, was described in a paper read before the American Congress of Physical Therapy in Pittsburgh.

When the method is used a general anesthetic is not required. A portable refrigeration unit has been developed to produce the chill. The unit measures 14x14x28 inches and weighs 100 pounds. It is easily transported, and can be operated by the generator of a truck or automobile. Two patients may be treated simultaneously.

The method was devised following experiments in which limbs were immersed in ice water or packed in ice. With the mobile refrigeration unit, numbness may be produced more conveniently, Dr. Crossman said. "It is important to emphasize that the tissues are not frozen," he continued.

The technique is equally valuable in cases of compound fractures and burns, he said, and has been found satisfactory in Army and Navy hospitals.

"Cold nerves," he explained, "cannot transmit impulses and cold tissues cannot respond with shock. The wounds heal better after refrigeration than after other means of operation."

Dr. Crossman said that refrigeration, by minimizing infection and loss of blood, made it possible to amputate limbs lower than is necessary in other techniques. High thigh operations at City Hospital in New York have become "practically obsolete," since experiments began, he said, and the mortality rate in gangrene cases has been reduced substantially.

Henry Products Follow the Flag!

AT HOME • ABROAD • ON THE SEA . . .

Today—let's concentrate only on winning the war. Nothing is more important than restoring human rights to enslaved millions and making our own precious Democracy secure. Because Henry Products are needed by the armed forces, our workers, our machinery and our resources are in the service until an all out Victory is achieved.

PACKLESS AND PACKED VALVES • STRAINERS • DRYERS FOR REFRIGERATION AND AIR CONDITIONING
AMMONIA VALVES • FORGED STEEL VALVES AND FITTINGS FOR OIL, STEAM AND OTHER FLUIDS

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1001-1019 NORTH SPAULDING AVENUE • CHICAGO

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment to "The Question Box."

RESTRICTED CAPILLARIES

QUESTION 507: On condensing units using F12 and capillary tubes we often find them with restricted capillaries. In reverse flushing the capillary we got out flakes of a black stuff resembling a black pigment ground in oil. When that stuff is all flushed out the unit works properly. I do not know the whole history of each job but it seems that the trouble occurs after a compressor has been changed in the unit. What is it and how to prevent it?

Can you describe the operation of the Imperial No. 476-C refrigerant transfer unit? Can you describe the operation of other charging units or boards?

Regarding the Imperial unit it seems to me that when it is necessary to refill a partially filled service drum the gas in the drum will have to be wasted.

Not so long ago a city inspector told us we needed a "pressure limiting device between the supply drum and the weaker container to limit the pressure to a safe value for the weaker container." Can you explain what such a device might be? When transferring refrigerants from a large cylinder to the service drum both containers have the same ICC pressure ratings, in other words there is no "weaker container." In charging a unit, the unit is the "weaker container" because it is rated at 175 lbs. or less. An automatic expansion valve could be used, presumably, but an adjustable one could be set for any value within its limits so that at times it may not be set at a value which would limit the pressure to the test pressure on the unit. Also, if a shut-off valve was installed after the pressure reducing valve for the purpose of not always losing the gas left in the reducing valve, a dangerous situation arises due to the fact that the line between the reducing valve and shut-off valve is loaded with liquid and since it cannot back up through the reducing valve the line could burst if the temperature of the refrigerant in that line was increased.

ANSWER: As you know F-12 is one of the best solvents one can find. It is even better than carbon tetrachloride. It is very likely that the compressors as you receive them are not thoroughly clean, and the F-12 is dissolving any scale, gum or other foreign matter that may be in the compressor.

This foreign matter would then circulate with the refrigerant, and a logical place for it to be caught is in the capillary tube. The only way that one can prevent this is to improve the type of filter used ahead of the capillary tube.

I would suggest the use of either a Zenith filter or one of the new type AP Trap-Its.

The operation of the Imperial No. 476-C refrigerant transfer unit is the same as all other units of this type. In other words, it is simply a device which cools the refrigerant before it enters the drum being filled, producing the same results as cooling the drum being filled before charging. It would not be necessary to discharge any refrigerant from the drum before filling.

Your city inspector has me stumped also. I don't know what he means by the pressure limiting device between the supply drum and the weaker container; nor do I understand why such a thing should be necessary. I have never heard of any inspector make this request, and I don't know of any device on the market which would be suitable for this purpose. It may be that he is confused with the requirements of some pressure vessels where it is necessary to have a pressure relief valve which would limit the pressures to the extent that the valve would open up and release the pressure when it goes above a determined point. Such a device would hardly be practicable for this purpose because it would be continually leaking gas. Very few of these devices are such that they will close tight once they have released.

ARMY CAMP INSTALLATION

QUESTION 508: There are four mess halls hooked up identical to each other. Three of these jobs are giving trouble from the solenoid valves not always opening when the walk-in cooler thermostat calls for refrigeration. The solenoid valves are Detroit No. 683, with 7/32 orifice, 110/220 volts. The valve will just buzz at times, but will open if the circuit is broken and again closed, or if the

3-RING PISTONS
In All Par Models!!!

PAR compressors are really engineered . . . built like a fine automobile. That's why they are equipped with 3-ring pistons . . . one oil and two compression rings. When you buy a PAR unit, you get pistons—not "plungers."

Slower operating speeds . . . long piston strokes . . . reduced friction and lower operating temperatures—these eliminate excessive wear . . . keep maintenance costs at a minimum . . . insure long life.

PAR
Refrigeration Equipment

See your jobber's display of PAR equipment . . . or write the factory for your copy of the FREE PAR CATALOG "R"—a manual for service engineers!

LYNCH MANUFACTURING CORP., Defiance, Ohio
Formerly Modern Equipment Corp.

★ ★ FOOD - THE FIRST LINE OF DEFENSE CONSERVE IT WITH REFRIGERATION! ★ ★

liquid line by pass around the valve is opened so the pressure is equalized across the valve. There are two valves on one job and one on two others, that give this trouble every now and then. The head pressure on these machines which use Freon 12 gas ranges from 125 to 150 lbs. None of them are overcharged or undercharged. I have checked the voltage at the valves, changed one valve and one mercury thermostat on one coil but it will still not open at times. Any help or information you can give me on this problem will be greatly appreciated. These jobs also have an Alco evaporator pressure regulator installed in the suction line between the manifold and compressor which I cannot see a reason for. These jobs are York 2 and 3 h.p. with 2 boxes on the 2 h.p. and 3 boxes on the 3 h.p. They use Peerless No. 93 or No. 132 blower coils and all operate at the same temperature.

ANSWER: All these valves are rated for a definite lift and usually are rated in terms of pressure they will open against. The No. 688 valve with 7/32 orifice should open against 150 pounds pressure, but apparently for some reason the valve you have is operating against a higher pressure than this or due to some condition in the system or the electrical circuit is not lifting its full load. In all cases, however, it is best to allow a good margin of safety, and since you state that the head pressure at times goes up to 150 pounds, this indicates that you are operating the valve to its full capacity.

In checking over the figures you have given me, it appears that the solenoid valves have too large an orifice. For a job of this size a 3/16 orifice would be large enough, and this would give you a greater margin of safety in the lifting power of the valve. The lifting power increases with the decrease in orifice size.

Another point to check is whether or not the valves are connected into the electrical circuit in parallel or series. They should be connected in parallel because if connected in series, their lifting power is reduced considerably. It might also be well to secure either a 110 volt or 220 volt valve, whichever you require. It seems that the combination of 110/220 volt valves do not have the lifting power that the valve for either one of these voltages will have. I think, however, if you will change these valves to 3/16 orifice you will find that your troubles are over.

The Alco evaporator pressure regulator is probably used to improve humidity conditions in the particular cooler on which it is installed. By limiting the pressure to which the evaporator is allowed to pull down to, thus limiting the lower level of the evaporator temperature, it is possible to control humidity in the refrigerator.

They are also used to assure defrosting of an evaporator where the load conditions on the evaporator may be greater than on the others connected in the same system.

MONTGOMERY WARD

QUESTION 509: We have a Montgomery-Ward box charged with methyl chloride in for repairs. We discovered a leaky seal in the compressor and replaced it with a new rotary seal. After two weeks of operation, the new seal was also leaking.

Could you please advise us how to correct this trouble? We have been told that by adding a small quantity of silica gel in the crankcase, it would correct this trouble. If so, please explain to us just how this correction would come about.

ANSWER: The Montgomery-Ward refrigerator on which you are having seal trouble is charged with Methyl Chloride and must be a Universal compressor. Montgomery-Ward during past years have used several different makes of condensing units, but the only one charged with Methyl Chloride was manufactured by Universal Cooler Corporation. Therefore, if you are having difficulty with the seal it may be well to get a replacement from Universal.

About the only thing which would cause the seal to continually leak is dirty oil in the compressor or a front main bearing badly worn or out of line. It would be well to check these points before replacing the seal again or before repairing the one that you have at present. Any dirt in the oil or in the crankcase of the compressor may eventually work its way through to the seal's surface, thus causing it to leak.

If the front main bearing is badly worn or out of line or if the shaft is bent, the seal would not be permitted to run true, thus again causing it to leak.

I would not under any circumstances add silica gel to the crankcase. I think you would create a great deal more trouble in the system than you have now.

LEONARD COMPRESSOR

QUESTION 510: A customer of mine has a Leonard L55L cabinet with a Kelvinator high side float system. It employs a single cylinder type compressor. During the winter months the porcelain enameled evaporator

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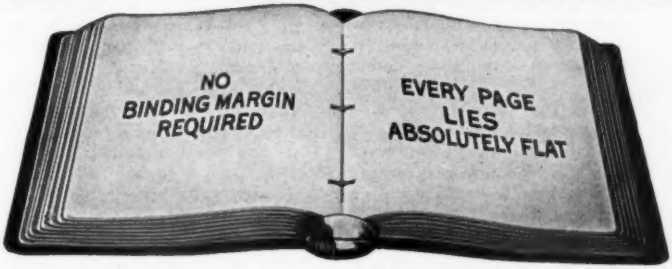

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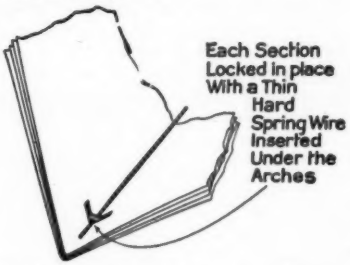

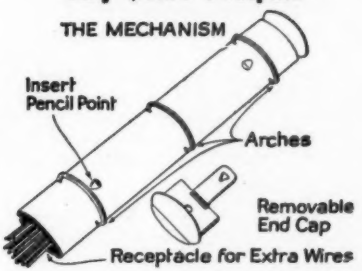

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had sprung a leak near one of the seams, causing the gas and oil in small quantities to come out, thus making the refrigerator useless. The gas was pumped back at that time by another service man. This summer I was called to do the necessary servicing and a new stainless steel evaporator was installed. I removed the liquid temperature valve from the old evaporator and placed it on the new one. The necessary service operation exactly as called for by the company's service manual was carried out. At first I was able to get the unit to operate fairly well, cutting in and out and freezing cubes only after some lengthy running, altogether too long for normal operation. I made a check-up on the compressor, found that a vacuum of 28 inches was easily attained. The refrigerant charge was carefully balanced so the evaporator would hold frost. A nice hard coat formed evenly but never a heavy coat as is usual, especially during the summer. I found the low side operating pressure wavered at times between 15-20 inches, usually remaining close to 20 inches. This seems low and would appear short of refrigerant. By carefully adding vapor gas to the low side, back frosting would develop. Then purging at the float of the excessive gas followed, but still the low operating back pressure remains and the compressor will run for very long periods before cut off and sometimes the evaporator temperature will not get colder than 20° if run for hours.

Do you think you can tell me just why I am having this sort of trouble?

What is your idea of changing the system? In place of the liquid temperature valve place a Detroit No. 672 Expansion Valve. Remove the high side float and place a standard receiver. This, of course, makes a very simple, oldfashioned system, but of all the systems I find they seem to refrigerate and make the least trouble.

ANSWER: In my opinion there are only two things which could cause a refrigerating system to run with such a low back pressure and as high an evaporator temperature as 20°. These are: Too much oil in the evaporator or a restricted suction line.

I think we can eliminate the possibility of too much oil because with SO_2 the oil floats on top of the refrigerant and when you overcharged the system until frost appeared on the suction line, the oil should have returned. This leaves only one probable cause of trouble and that is a restricted suction line.

I would suggest that you look for a kinked line or for a clogged screen or perhaps for some large piece of foreign matter lodged in the suction line. It will very likely be necessary to disconnect the suction line to make sure it is clear.

The back pressure on these units should be about 6 inches of vacuum when the unit is ready to cut out.

I don't think it is advisable to change this system to an expansion valve because the type of evaporator is not suitable.

SHORT CYCLES

QUESTION 511: Hooked to an aerator brine tank is a ¾ h.p. Carrier-Brunswick with Detroit pressure control, No. 250 with a setting of 15 lbs. and 6 lbs. using CH3CL.

The pump developed a very bad knock. Not being able to get a replacement at once, I washed out crankcase thoroughly which had particles of bronze from the seal mixed with what little oil was left. Cleaning of crankcase and valves and the proper amount of oil had this pump sounding very nice. Later I get a report that it seldom kicks off. At this time 3 lbs. of F12 was added instead of CH3CL by mistake. In about two weeks I find it short cycling. After being down over night, then turned on, it'll run for an hour, then begin to short cycle, on and off about six times a minute. By closing S.S.V. and pulling down to 6 lbs. it kicks off and holds at 6 lbs., indicating no leak back through valves. Assuming the Fedders No. 33 Thermo valve was defective, I installed a Detroit Thermostatic 673 and I'm getting the same identical results. With close to 100 lbs. head at about 85° F. after a real purge, this faulty condition could hardly be blamed on a short charge. What would you suggest?

ANSWER: There are a number of things which might cause the system to short cycle, most likely of which are: shortage of refrigerant, liquid line strainer clogged, moisture freezing in the expansion valve, expansion valve feeler bulb not submerged in the brine.

F12 is one of the best cleaners and solvents obtainable, equal to or better than carbon tetrachloride. Since three pounds of F12 have been put in this system, it is possible that considerable dirt and foreign matter have been loosened in the system and are being trapped at the screens. A partially clogged screen at the expansion valve or at the receiver valve would cause short cycling.

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So *don't* quit your job. Instead, take care of your customers. Help them by providing the necessary services and repairs to their refrigeration equipment. They in turn will be able to take care of the war workers. And later, when it is all over, they will take care of you. Brunner Manufacturing Company, Utica, New York, U. S. A.

NEW BRUNNER REFRIGERATION SERVICE MANUAL

The new Brunner Refrigeration Service Manual, the most authoritative book of its kind, tells and shows you how to locate refrigeration equipment trouble and how to correct it.

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Moisture freezing in the expansion valve would produce the same symptoms, but warming the valve when the trouble occurs should temporarily overcome it.

It is possible that the level of the brine in the tank has decreased since you last inspected it, thus exposing the thermo bulb to the surrounding air temperature and causing short cycling.

FREEZER CABINET

Question 512: I built a refrigerator on a farm for purpose of freezing spring chickens for cold storage and am having a little trouble bringing the inside of the freezer box down to temperature.

The box consists of a domestic old type Seegar, 10 cu. ft., porcelain lined, and insulated with three inches of cork; it has three doors. This box is built inside of a walk-in cooler 6 ft. high by 5 ft. deep by 6 ft. wide. This second cooler is built inside a cold cellar in which the temperature stays around 55 to 60 degrees about all year around. The walk-in cooler is insulated with three inches of rock wool and is tarred inside and out.

The coil was arrived at after quite a bit of experimentation: it consists of about 15′ of ¾″ O.D. copper tube swedged to ½″ on each end to accommodate the expansion valve, which is an adjustable type Detroit, and the suction line. This coil frosts up very nicely to about a half inch or so past the bulb of the valve.

The condensing unit was taken from a 1927 or 1928 M-12 Frigidaire cabinet. It consists of a twin-cylinder compressor and a ¼ h.p. motor with a coiled tube condenser. I speeded the compressor up by increasing the pulley on the motor to 550 r.p.m. as it works on a low pressure cut-out switch and takes too long to pull down otherwise.

The compressor cuts out at 22 inches of vacuum and pulls down in about 5 min. running time but I can't seem to get a lower vacuum or pull the cabinet temp. below 15°. Yet if I close off the suction service valve the compressor pulls down to within a fraction of 30 inches almost immediately. If I adjust the valve any more I starve the coil or flood it clear to the compressor.

This is a sulphur job but I am using a methyl valve as I am using material on hand; yet, I have used methyl charged valves before on both sulphur and Freon jobs with marked success, except that I never tried this cold a temperature before.

My suction line is about 5′ long as the condensing unit sits on the outside of the cold cellar wall.

I wish to pull the box temperature down to 0° or slightly less. Do you think a thermostatic motor control would be better than the pressure type?

What do you think is keeping the box temperature up? Is it possible that the expansion valve may start to leak slightly after a 22″ vacuum is pulled?

Answer: I don't believe that your trouble is due to the fact that you are unable to obtain a lower vacuum in the system. The compressor of the type you are using is hardly suitable for pulling a lower vacuum than that you are obtaining, and at the same time, handling a sufficient volume of gas to produce any work.

The suction pressure of 22″ that you are now obtaining with SO_2 should give a refrigerant temperature in the coil of about —30° F. and a coil temperature of about —25° F. If the cabinet does not come down lower than 15° with this coil temperature, I would be of the opinion that the coil is not large enough for the job it is doing. However, let us see how this works out mathematically.

A 10 cubic foot box would probably have an outside surface area of about 60 square feet. With 3″ of cork insulation and a 55° temperature difference, the heat loss through the walls of the box would be $60 \times 55 \times .08$ equals 264 B.t.u. per hour.

For a fixture temperature of 0°, the K factor of bare pipe or copper coil will be about 2 B.t.u. per hour per ? ° F. temperature difference per square foot of coil surface. For ¾″ tube the K factor will be .892 B.t.u. per lineal foot.

If we plan on a temperature difference between the refrigerant in the coil and the air surrounding it of 20°, we would need

$$\frac{264}{20 \times .392}$$ equals 33′ of ¾″ tubing.

Now, all these calculations are on the basis of the hourly loss and do not allow for the idle time of the system. If we take this idle time into consideration, our figures would probably show that closer to 50 feet of tube would be needed.

The information you have given me is not sufficient to make any definite calculations, and it is the purpose of these figures only to bear out my original statement that the present coil is too small for the purpose.

I believe you will find it necessary to at least double its present length. After you have made these corrections, you may find it advisable to change to the system to

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Methyl Chloride. Methyl Chloride would be much better to use on such low temperature work since the suction pressure can be much higher with Methyl Chloride than with Sulphur Dioxide.

YORK FLOAT CHATTERS

Question 513: The company for which I work has an air conditioned office and among this equipment which is a complete summer and winter job is a refrigerating unit consisting of 2—3 cylinder compressors driven by a 20 hp. motor. This unit is for the purpose of reducing the humidity of the circulated air. This unit was built by the York Ice Machinery Corp., of York, Pa.

Our trouble has been in hot humid weather, this machine would not produce the desired results. It is equipped with a high side float and this float chatters continually when the unit is in operation. Recently, we cut out the float and operated the machine by way of a manually controlled expansion valve and now we seem to be getting much better results. The head pressure and temperature are much lower and the water to the sprays is much cooler.

The air conditioning unit above consists of finned coils through which well water at 56° is circulated and the York machine cools the water which is circulated through the sprays for reducing humidity. The condition at present is:

Discharge Pressure—82 lb. formerly was 125-130
Suction Pressure—31 lb. formerly was 35-42
Condenser Water Temperature 56°
Water on sprays Temperature—48°
Dew Point—60°
80 G.P.M. through spray.

Under these conditions, is the pressure about what it should be and what would you suggest in regard to the float? This unit is charged with Freon.

Answer: From the data that you have given, the plant evidently operates satisfactorily at 31 lbs. evaporator pressure and 87 lbs. discharge pressure when using a hand expansion valve. When using the high pressure float the discharge pressure goes to 125 lbs. or 130 lbs. and the suction pressure is 35 lbs. to 42 lbs.

If we examine the temperatures corresponding to these pressures we will find that the 31 lbs. are equal to 33° F. which is very close to the freezing point, therefore, is not a very desirable condition to have present for a very long period of time. Suction pressure of 35 lbs. equals 38°, whereas 42 lbs. is equal to 46°.

The purpose of the high side float is to keep all the refrigerant out of the condenser and into the evaporator and the chattering of the floats may be caused by a damaged pin or seat thus allowing high pressure gas to pass into the evaporator. This would account for the higher suction pressure in the neighborhood of 35 lbs. to 42 lbs. so that it is obvious that this water cannot be cooled down to 48° at a pressure of 42 lbs. which is equal to an evaporator temperature of 46°.

I would suggest that this high pressure float be examined carefully to see whether the valve has been damaged or whether dirt has gotten into the leaker port.

Another possible cause for this chattering is insufficient Freon-12. In some cases a low charge of refrigerant sufficient to operate a hand expansion control will not be enough to prevent chattering of the float, however, I am inclined to believe that the damage to this float is the principal cause of difficulty.

In regard to the ⅓ hp. Kelvinator, I believe your trouble is due to a faulty expansion valve or to a leak of refrigerant in the system. The trouble is definitely not due to the compressor. You have not given me sufficient information, however, to determine which of the two it may be. It should not be difficult to test for the proper amount of refrigerant or to test the expansion valve for proper operation.

SERVICEMEN ARE SCARCE

BECAUSE 75 per cent of the refrigeration repairmen in Lincoln, Neb., have gone into the army or to defense jobs, many calls for service and repairs are going unanswered. So critical has it become, said a refrigeration operator, that it would be extremely difficult to answer a plea for help from a user of a large commercial plant.

Generally the large plants are under the constant supervision of an engineer on the payroll of the refrigeration concern but that isn't the case in Lincoln, at present.

A canvass of the Lincoln shops has revealed that no operator will agree to make repairs or service a machine "now."

Some have been compelled to refuse calls from private homes. Generally the answer is: "We'll try to get around to it in a few weeks" or "We'll get there as soon as possible."

★ ★

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REFRIGERATOR SERVICE MAN PUNISHED FOR CONTEMPT

IN an order signed September 21, by Supreme Court Justice Kenneth O'Brien, George S. Montague was held to have violated an injunction recovered by General Electric Company against him in June, 1941. The Court imposed a fine of $250 upon Mr. Montague.

Mr. Montague and Margaret L. Montague who had been doing business under the name of General Electrical Refrigerator Service Co. of Queens, were enjoined in June, 1941, from using the words "General Electric" or any abbreviation or contraction of those words in their trade name, or from using post cards or business cards using the words "General Electric Refrigeration Service." Mr. Montague was further enjoined from all acts of unfair competition and from using any advertising which would lead the public to believe that he was in any way connected with General Electric Company or acting under any approval or authority from it.

Nevertheless, Mr. Montague used the phrase "General Electric Refrigeration Service" on his cards and a picture of the monitor top unit of a General Electric refrigerator on business envelopes. The Court held that the use of these words was in violation of the injunction and that the picture of the monitor top unit tended to deceive the public into believing that Mr. Montague was an authorized agent of General Electric Company for the servicing and repairing of its refrigerators, or in some way associated with General Electric Company in such repair and service work contrary to the fact.

It is provided in the order that if Mr. Montague fails to pay the fine within ten days after service of a copy of the order upon him that he shall be committed to jail.

SERVICE COMPANIES WARNED

THE Office of Price Administration has advised that refrigeration service companies in the New York area have not complied with Maximum Price Regulation No. 165, as amended. Other sections of the country may be at fault in a similar manner.

This order called for the filing of a report by September 10, 1942, with the War Price and Rationing Board, 535 Fifth Avenue, New York. The report must give a complete and accurate description of the services rendered, highest price for these services as of March 1, 1942, whether billing is done at contract and/or time and material rates. If billing is on contract prices the reporting company must show the charge of March 1, 1942, listing the rates charged per make and the rates adopted for age and size of unit. The time and material method of billing should show the labor charge and the different rates for individuals and corporations, if such exist. Manufacturers' or jobbers' catalogs should be used to estimate the price charged for material and statement should be made whether price charged is list; if above or below, percentage should be given. If both methods of billing are used, that is on contract prices and time and material as well, the report should so state.

No official form exists for the preparation of these reports. Company stationery should be used. Reports should be made in duplicate, one copy going to the OPA while the other is retained. Records must be kept current, as they may be inspected at any time.

Persons who have not yet filed a report should do so at once. They will then receive permission to continue doing business; but those who do not can have their license revoked and are subject to fine.

For detailed instructions, application should be made to the War Price and Rationing Board, 535 Fifth Avenue, New York, for a copy of Maximum Price Regulation No. 165, Manual No. 2.

REFRIGERATOR TRANSFER ORDER IS AMENDED

AN order has been issued as Amendment 2 amending paragraphs a, b, c and g of Limitation Order L-5-d restricting transfer of new domestic mechanical refrigerators. It became effective September 5.

The amendment provides that no new domestic mechanical refrigerator shall be transferred except through normal distributive outlets on a basis proportionate to the manufacturers' or distributors' distribution of new domestic mechanical refrigerators during the year 1941, regardless of any previous commitments or contracts. No changes are made covering transfer of a domestic mechanical refrigerator pursuant to specific authorization of the Director General for Operations nor for delivery to the Army or Navy, the U.S. Maritime Commission, the War Shipping Administration, or the Panama Canal.

Any new domestic mechanical refrigerator which on February 14, 1942, was in the in-

Today-more than ever YOU need this book

WHETHER you **OPERATE** a plant, **SELL** refrigeration equipment, or are a **STUDENT** of refrigeration, this **NEW** book gives you the basic facts and principles involved in the processes of mechanical refrigeration. Now, more than ever before, today's conditions demand your thorough knowledge and understanding of these pertinent facts.

Now, in this new book—just published—is included refrigeration **theory—practice—applications**—set down in easy-to-understand language for both the student and the engineer—practical and authentic information that will help you to diagnose, correct conditions, operate and design an efficient installation.

REFRIGERATION *Theory and Applications*

by H. G. VENEMANN

Associate Professor of Refrigeration
Purdue University

The author, H. G. Venemann, Associate Professor of Refrigeration, School of Mechanical Engineering, Purdue University, Lafayette, Indiana, has a wide background of practical refrigeration experience. The book is the result of many years' study of refrigeration problems both in the field and as an instructor and is presented to the operating engineer and student as a complete treatise on fundamental principles involved in processes of refrigeration with typical applications to assist the engineer and student to design and operate plants.

The subject matter is graphically presented by the use of charts and illustrations in chronological order and the Table of Lessons reproduced indicates the important subjects discussed.

One of the principal features of the book is the problems presented to the reader at the end of each chapter. By this method it is comparatively simple for the reader to self-examine himself on the subject covered in each chapter.

264 Pages
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Refrigeration by Melting Mixture of Salt and Ice.
Refrigeration by Evaporation.
Cooling the Refrigerant.
Compression, Cooling and Condensation.
Refrigerants.
Air as a Refrigerant.
The Theoretical Compression Cycle.
Variable Loads and Their Influence on Compressor Performance.
Theoretical Performance Characteristics of a Compressor.
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ventory of a dealer, independent distributor, or any other person not a manufacturer or affiliated distributor, may be transferred without limit provided that the transfer is to an ultimate consumer. New domestic mechanical refrigerators may be repossessed on default but they may not be transferred thereafter except in accordance with provisions of the original order.

Paragraph (c) (2) of the amended order provides that a certificate of transfer on Form PD-430 may be issued to permit the transfer of new domestic mechanical refrigerators under certain conditions, including from one warehouse or place of storage to another warehouse or place of storage whether or not it involves any change in the ownership or title of such refrigerators. Transfer also may be made from any person to any other person when the transfer does not come within the provisions of another Paragraph of this Order. Transfer may be made from any manufacturer or affiliated distributor to any person without limit as to number, provided the words "unlimited transfer" appear on such certificate.

Paragraph (g) as amended requires manufacturers and others to file with the War Production Board a report of all shipments from their stock of refrigerators.

HAVE YOU RECEIVED YOUR LICENSE YET?

SERVICE men who have not received licenses under WPB Order P-126 should look to the matter at once, since it is possible that the present list of licenses may be "frozen," according to a rumor originating in Washington. Applications if made out in proper form are acted upon within two or three weeks. Many have been received, however, which were not made out in a correct manner and of course have not been given attention for that reason.

"We have not turned down any applications which were filled out properly," said an official of the Refrigeration Section, General Industrial Equipment Branch of WPB. "We do not intend to put anybody out of business. The forms are available only to individuals and companies certified by either a machine manufacturer, a coil manufacturer, or an owner or lessee of refrigerating equipment."

Service men who have waited longer than three weeks after making application should have their names certified by one of the three agencies listed above, in which case they will receive a new set of forms. Each question should be answered with care and the entire list of questions and answers checked at the finish to make sure nothing has been overlooked. A number of the applications in the inactive file at Washington are filled out properly but no name, city or state is given where it says "address."

Order No. P-126 states: "An emergency service agency shall not apply any preference ratings . . . until he shall have filed with the War Production Board a statement (in triplicate) properly executed, on Form PD-399; and shall have received from the War Production Board a serial number which shall thereafter be endorsed on all purchase orders or contracts for material placed by him, rated pursuant to this order."

NEXT VICTORY PROGRAM MEETING AT CINCINNATI

AS the October issue of THE REFRIGERATION SERVICE ENGINEER went to press, Director John K. Knighton of Evansville, Indiana, announced the confirmation of plans to hold a midwestern meeting of the Victory Program of the Refrigeration and Air Conditioning Industry, on October 26, in Cincinnati, Ohio.

Mr. Knighton who has just returned from a trip to the Pacific Coast is very enthusiastic over the progress which the conservation movement is making in the refrigeration industry of that area. He looks forward to a rousing meeting in Cincinnati and has called upon all branches of the industry for a representative turn-out.

Representatives from all groups of the industry attended the Victory Program meeting September 25 at the Biltmore Hotel, Los Angeles. Mr. Knighton and A. B. Schellenberg, president of the Alco Valve Co., St. Louis, were the main speakers. Clarence F. Pratt, of the California Refrigerator Co., San Francisco, served as chairman.

"The guarantees of attendance from the various branches of the refrigeration industry in the Cincinnati region and the high interest which was at once apparent," said Mr. Knighton, "led us to select that city. We have not yet arranged for our hotel, but will do so within a few days. We promise an interesting program and believe that much good for the refrigeration industry should come out of the meeting."

"Refrigeration Goes To War," the brochure printed by the Victory Program Committee will be distributed at the meeting.

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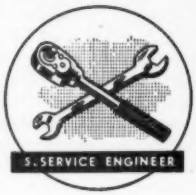


THAWZONE

Fully Protected by U. S. Patents

The PIONEER FLUID DEHYDRANT

A PERSONAL MESSAGE TO MY FELLOW REFRIGERATION SERVICE ENGINEERS

FOR many months now, each and every one of us have been so pre-occupied with our personal efforts to secure parts, satisfy our customers, and make a whole-hearted attempt at getting a goodly portion of our calls completed in reasonable time, that we have neglected some of the more basic points of importance in our industry.

I know it has been discouraging of late and it will undoubtedly be worse before it is better, but let us stop and think a minute, have we been getting soft these last few years? The answer is, without question, yes. Some of the older men, in reminiscing, will certainly agree that twenty years ago refrigeration men had far less to work with than we have now, priorities, limitation orders, etc., notwithstanding. They depended entirely upon their ingenuity. We must do the same today if we are to survive this emergency.

An important asset to the service field of today is the RSES, the many benefits of which were not known to the men of 20 years ago. The RSES today is a young growing organization and with the support and cooperation of its many members, it can be the means of pulling us through these very difficult times. Where the men of twenty years ago had to depend upon their own individual ingenuity we, today, through the medium of RSES, have the advantage of the collective ingenuity of thousands.

The ranks of the RSES will naturally be thinned somewhat by our members being called into the armed forces and by some who will leave us for the duration to enter more lucrative defense work. These men will be replaced, to some extent, by young inexperienced men. Reach out for these men and take them into your local chapters. They need you and you need them. Give them a chance that possibly you did not have. You will profit greatly by it in the end. For every man we lose to the armed forces or otherwise, replace him with two more men who are new to our industry and deserve all that we can offer them. Let us also make an extra special effort to bring in those men who have not, as yet gotten around to affiliate with us. Now, as never before, we need them with us, but we must also have something of practical value to offer them.

Each month I shall see that the progress of each one of our local chapters is reported through these columns in this respect. What do you say, fellows, let's make the "V" in our industry a big one. Watch the next issue. My mail box is large, let me hear your ideas.

S. B. Garland, Chairman
International Membership Committee, RSES

x x x

R.S.E.S. Chapter Notes

KANSAS CITY CHAPTER

August 23rd was the date of the chapter's annual picnic held at the home of Roy F. Cox in North Kansas City. A meeting was also held on this date, but not before a hearty meal was enjoyed by those present. The application of Edwin L. Smith for membership was voted upon and Mr. Smith was welcomed as a member. The balance of the period was devoted to fun and enjoyment.

Sept. 8—The meeting was held in the home of A. M. Hoover. Floyd Haller was initiated as a new member and membership cards and certificates were distributed to those who had paid their dues to date. The educational period was devoted to discussion on activities essential to the war effort. Conservation of materials, priorities, the individual desires and abilities were the main topics.

SOUTHERN OHIO CHAPTER

The chapter reports that three of its members are now working for the War Department. President Poole is engaged in aviation radio at Patterson Field, Dayton, Ohio. H. Smallwood is a radio inspector for Curtis Wright and Russel Hissam is an army cadet flying instructor. Thus the Southern Ohio Chapter is well represented in our war effort.

TRENTON CHAPTER

Sept. 10—The meeting was held in the home of President Franklyn Beemish. As a parting gift to former treasurer, Frank Sujansky, who is now serving in the armed forces, the chapter presented him with a fitted military case. It is also planned to provide Mr. Smallwood with a paid-up membership for the duration. Marcel Liberty was elected to fill the office of treasurer. In an effort to conserve parts among the membership, it was decided to draw up a list of spare parts belonging to each member which they are willing to sell. This list would then be distributed among those members so that they could be drawn upon as the need arose. Refreshments were served after the meeting.

TRI-COUNTY CHAPTER

August 21—The attendance prize was drawn in favor of B. V. Clark. Some discussion on the state convention led to a motion by Willis Stafford and duly passed that the convention be held as planned. The balance of the evening was devoted to business.

MILE HIGH CHAPTER

Sept. 14—President Charles Land called the meeting to order and after the usual routine of business, the meeting was thrown open to general discussion. Questions and answers on various government orders proved to be of the greatest interest with particular reference to ratings that could be applied under preference rating order P-126 by concerns having licenses. Limitation order L-88 also came in for considerable discussion. Other regulations which attracted much attention was price regulation 165, priorities regulation 10 and the allocation classification system. Refreshments were served by Mr. Hemphill and Mr. Land after the meeting.

ST. LOUIS CHAPTER

July 9—The meeting was called to order by President E. C. Fix. The speaker of the evening, Mr. A. H. Grace, of the St. Louis Priorities Field Service War Production Board, spoke at length on what the WPB is trying to do to help the men in the maintenance of refrigeration equipment and what priorities are being issued for the refrigeration industry. Many questions were asked of the speaker when the floor was open for discussion. The report of the Board of Directors on the changing of the Constitution and By-Laws of the Chapter were read by the secretary. After a lengthy discussion on the proposed changes which are to be voted upon at the next meeting, Mr. S. Nill Mohler made a motion that Mr. E. A. Plesskott be made a Life Member of the St. Louis Chapter in appreciation of his work for the International RSES and his own chapter. The motion was unanimously carried.

August 13—Mr. E. Gygax, educational chairman, introduced the speaker of the eve-

ning, Mr. O. F. Hilldebrand of the United States Engineering Office. Mr. Hilldebrand spoke at length of the different types of refrigeration used by the Army in preserving foods. His was a most interesting talk. Movies released by the Office of Emergency Management were shown and then the business of the chapter was dispensed with. Articles 4, 6 and 8 of the Constitution and By-Laws of the Chapter were voted upon to be changed. The voting was unanimous. New members of the chapter are Messrs. Steve Aspromonte, Tony Grous, George Kueckens, William Matejka, Joe Pedrotti, and Harold Sommers. The meeting was then adjourned.

DAYTON CHAPTER

August 27—The meeting was held at the South Park Appliance Shop in Dayton. An open discussion on price ceilings and priorities occupied the greater part of the evening after which refreshments were served by the host.

KANSAS CITY AUXILIARY

August 11—The ladies met at the home of Mr. and Mrs. E. L. Tramposh. The greater part of the evening was devoted to the business of the auxiliary. Mrs. Dahl was a guest for the evening. Refreshments were served following the meeting.

August 25—The meeting was held in the home of Mr. and Mrs. Roy Cox which followed a picnic in the back yard with members of the men's chapter. Cards and letters of thanks from several grateful recipients of gifts from the chapter were read and Christmas card samples were exhibited by Mrs. Hoover. Mesdames Smith and Morley were guests for the evening.

S S S

WILLIAM G. ANDREWS IN U. S. NAVY

WILLIAM G. ANDREWS, Detroit Lubricator's Representative in the Southeastern territory, is now in the U. S. Navy. Warrant Officer Andrews, a member of the Virginia Chapter, is Officer in Charge of the Power Plant Division at the U. S. Naval Air Station, Miami, Florida.

S S S

LUBRICATE THE CONTROL BULB

WHEN you are assembling a new control into an electric refrigerator, put a bit of soap on the bulb, and it will slide through the rubber grommet much easier.

Motor-Starting CAPACITORS

● **Makes no difference whether that capacitor-type motor calls for an electrolytic or an oil-filled capacitor. Aerovox makes both kinds.**

And to make certain that you'll get the correct type, Aerovox issues an up-to-the-minute catalog listing ALL standard motors and their replacement capacitor needs. Meanwhile, live-wire refrigerator-parts jobbers stock these Aerovox replacement capacitors.

● ***Ask Your Jobber . . .***

He'll gladly supply your motor-starting capacitor needs if he handles the Aerovox line. Ask for latest copy of Aerovox listings or write us direct.

AEROVOX CORPORATION
NEW BEDFORD, MASS., U. S. A.
In Canada: AEROVOX CANADA LTD., Hamilton, Ont.
EXPORT: 100 Varick St., N. Y., Cable "ARLAB"

FANCY FOOTWORK

—is necessary in wartime to keep the nation's refrigeration facilities running. That is YOUR job in the Victory Program.

Do your service work well to avoid call backs.

Herveen can help you.

HERVEEN

to SERVICE METER-MISERS

Herveen is the ideal replacement gas for servicing Frigidaire Meter-Misers. Many service men have solved their Meter-Miser servicing by using Herveen gas.

If your wholesaler does not stock Herveen—write us.

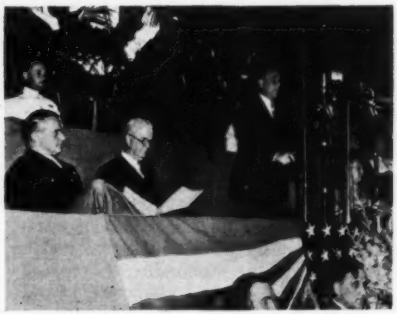
MODERN GAS CO., Inc.

Manufacturers and Refiners

1084 Bedford Ave., Brooklyn, N. Y.

MINNEAPOLIS-HONEYWELL WINS ARMY-NAVY "E" FOR HIGH PRECISION PRODUCTION

HOW the experience developed in 50 years of building heating, refrigeration and other types of automatic controls has been converted to volume production of high precision military instruments was revealed when Minneapolis-Honeywell Regulator Company received the first joint Army-Navy Production Award in the Chicago Ordnance District.



ACCEPTING ARMY-NAVY "E" AWARD

"To me this award is not so much a banner of achievement as a very definite challenge to every one of us," said Harold W. Sweatt, president of Minneapolis-Honeywell Regulator Company, as he accepted the joint Army-Navy "E" awarded his company. Left to right, Brig. Gen. Donald Armstrong, chief of the Chicago Ordnance District; Lyman E. Wakefield, president of the First National Bank and Trust Company, Minneapolis, and Mr. Sweatt (speaking).

"Minneapolis-Honeywell has provided much of the technical skill from which victory will come," declared Brigadier-General Donald Armstrong, chief of the Chicago Ordnance District, as he presented the award at an impressive ceremony August 18, which was witnessed by more than 4,000 employees and guests.

The award, granted the Minneapolis plant of M-H for its outstanding "achievement in the production of war materials" for both the Army and Navy, preceded by one day a similar celebration held at Wabash, Indiana, where another of the company's six plants is located.

"Minneapolis-Honeywell has produced far in excess of what we in the Army had anticipated," Brigadier General Armstrong

said in presenting the "E" flag to Harold W. Sweatt, company president, and Svenung H. Skogvold and Inga T. Erickson, oldest man and woman in point of service in the production department, who represented the workers. "All-out victories in industry such as you have achieved are necessary before we can expect to see victory by our armed forces," he added.

War activities of the company cover a wide range of manufactures, which include sighting equipment for the Navy and controls and gun sights for the Army. Minneapolis-Honeywell is still making a limited number of its peacetime controls for government and defense-housing projects, and in addition is manufacturing replacement parts for civilian use. The company has been able to adapt many of the principles of its peace-time controls to war use, and has recently developed new war devices which hold promise for further advances in all types of controls after victory.

Special buses brought the night-shift workers to the Minneapolis Armory, where the ceremony was held, and rushed them back following the program so that a minimum of vital production time was lost.

Mr. Sweatt gave assurance that "we fully realize this pennant represents only a generous recognition on the part of the Army and Navy for the start we have made here in building armament for the war effort . . . to me this award is not so much a banner of achievement but rather it is a very definite challenge to each and every one of us. It is a symbol of the faith that our fighting forces have in the ability and determination of this organization to back them up now and until victory is won."

The celebration, which was broadcast over two local stations, was followed by a company-sponsored dance which lasted until midnight. Employes and management shared equally in the entire program. The prize-winning M-H band played the opening and closing numbers, while guards from the plant's protection force formed a color guard for the raising of the "E" pennant on a specially erected flagpole located on the speaker's platform.

THE FOXBORO COMPANY, Foxboro, Mass. has issued Catalog 95-A, describing and illustrating its full line of instruments for measurement and control of industrial process conditions. The 48 pages group and explain all the instruments, accessories, and supplies appropriate for each application.

DRINKING WATER COOLERS FOR ARMY, NAVY AND MARITIME SERVICE and WAR INDUSTRIES

This new series of "Day & Night" Self-contained Drinking Water Coolers, available in November, includes a complete line of types and sizes complying with WPB Order Chapter I—L126.

These new models conform to the Government Program to conserve materials. They replace up to 35 different models previously specified and used by various Purchasing Agencies.

DRINKING FOUNTAINS

Type	Size	Fixtures	Day & Night Model No.
B	5	1 Bubbler	UAPP5-1
B	10	1 Bubbler	UAPP10-1

BOTTLE WATER COOLER

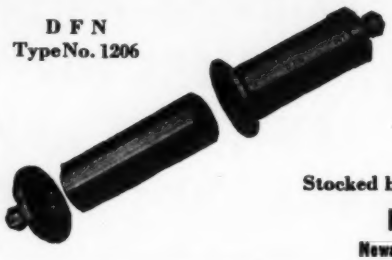
C	2	1 push Faucet	UAB2-1

CAFETERIA GLASS FILLER COOLERS

D	10	2 Glass Fillers	*R10-2
D	25	2 Glass Fillers	*R25-2

*Condensing units installed in field. All other models sold complete.

DAY AND NIGHT COOLER DIVISION
DAY & NIGHT MFG. CO.
MONROVIA, CALIFORNIA



D F N
TypeNo. 1206

A single cartridge demountable assembly of the
D F N SYSTEM
for the control of moisture, sediment and acid.
ASK FOR CAT. R-7.

Stocked by leading jobbers for your convenience.

McINTIRE CONNECTOR CO.
Newark **New Jersey**

SARAN PLASTIC TUBING

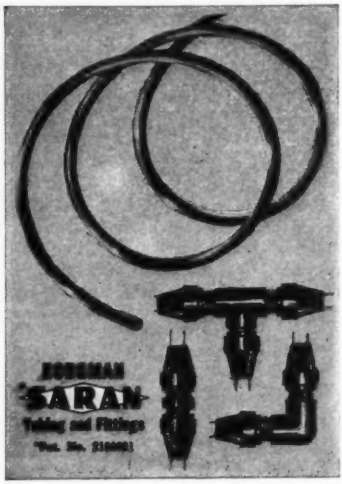
SARAN Tubing is a new plastic production being offered to refrigeration service engineers and jobbers by the Hodgman Rubber Co., Framingham, Massachusetts, licensee of the Dow Chemical Co.

Intended by the manufacturer to replace tubing made of critical metals which cannot now be secured, Saran Tubing comes from the testing laboratory well recommended.

The new plastic tubing is said to be adaptable for use under high working and bursting pressures, and is resistant to most chemicals. Its insulating qualities, flexibility, and the ease with which it can be worked seem to guarantee its satisfactory performance in refrigeration. No tools other than a sharp knife and a screw type flaring tool are needed, according to the manufacturer.

Other properties owned by Saran Tubing include a relatively sharp melting point, resultant retention of physical properties within the service temperature range, and long service life, even in the presence of corrosive agents.

In bending Saran Tubing at room temperature, the tendency to kink decreases with increasing wall thickness. At a wall thickness equal to 20% or more of the diameter of the tubing, it is extremely difficult to



Samples of Plastic Tubing Materials Made by Hodgman Rubber Co.

WATER REGULATORS
Pressure-actuated, renewable seat, ⅜", ½", ¾" pipe fittings.

SHUT-OFF VALVES
Semi-steel, carbon-steel, double-seated stem, Angle and Globe type.

ALL STEEL GAUGE SETS
Safety ball seats shut off liquid in case of glass breakage.

DEHYDRATORS
Furnished filled with Calcium Chloride, Activated Alumina, or Drierite and Silica Gel.

STRAINERS
Cylinder and Cone types, and liquid line scale trap.

ALL-STEEL LINE VALVES
Compact in design, completely rustproof, Angle, Tee and Globe types.

CYRUS SHANK COMPANY
625 West Jackson Blvd. **Chicago, Illinois**

kink or collapse. Even in those cases where kinking or total collapse does occur, the bursting pressure is reduced no more than 20%. Fabrication or bending to permanent desired shapes is easily accomplished. The tubing is formed at room temperature to the required shape plus allowance for 20% to 30% springback. It is then heated to 212 degrees F. for 15 to 30 seconds and on cooling will be set to shape. The heating may conveniently be obtained with boiling water or atmospheric steam. Without internal support, this tubing can be bent without kinking to a radius as small as three to six times the diameter of the tubing by the use of the same technique, but with the addition of an internal fluid. By this method, it is possible to fabricate many complex shapes.

Standard and stock sizes of Saran Tubing are:

Standard Size	Wall Thickness	Tolerance
3/16" OD	.031"*	.179-.191"
3/16" OD	.045"	.179-.191"
1/4" OD	.031"*	.240-.255"
1/4" OD	.045"	.240-.255"
5/16" OD	.031"*	.300-.317"
3/8" OD	.031"*	.380-.360"
3/8" OD	.062"	.380-.360"
1/2" OD	.045"	.465-.505"
1/2" OD	.062"*	.465-.505"
5/8" OD	.062"*	.580-.630"
3/4" OD	.062"*	.700-.755"

*Stock Size

CHRYSLER OFFICIAL NOW A NAVAL OFFICER

REGINALD G. WYLD, vice-president in charge of engineering, Airtemp Division, Chrysler Corporation, Dayton, Ohio, has been given a commission as Lieutenant, senior grade, in the U. S. Navy. He has reported for duty, and will be stationed for the present in Pittsburgh.

Lt. Wyld is well known to the refrigeration and air conditioning industry. He was associated with the engineering department of the Chrysler Corporation in Detroit before assuming his duties as chief engineer of Airtemp Division several years ago. During recent months he has been special consultant to the Airtemp office in Washington, D. C. on military problems involving refrigeration and air conditioning equipment. In this way his broad engineering experience has been made most valuable already.

STILL Giving Service

Our inflexible rule of giving the best possible service at all times has not been altered in the least by present day conditions.

Our complete stocks assure you immediate delivery except in rare cases. Get "Automatic" service at "AUTOMATIC."

Automatic
HEATING & COOLING SUPPLY CO.
647 W. LAKE ST.
CHICAGO

SPECIAL!
Our south side branch is now located at 809 W. 74th St. The telephone number is Vincennes 3373.

CONTROL REPAIR SERVICE

Because of the shortage of materials, 1942 will be a very busy one for the Service Engineers. Fewer replacement parts will be available, necessitating more repairs.

Why not send your control jobs to us? We recondition controls equal to new at a small cost. All our work guaranteed for one year. Prices on request.

UNITED SPEEDOMETER REPAIR CO., INC.
342 West 70th Street
New York City

HERMETIC REBUILDING

One of the largest hermetic rebuilding plants in the United States. Refrigeration units, parts and supplies. General Electric, Westinghouse, Grunow, Majestic, Crosley, Frigidaire, Norge, Kelvinator, and others. Write for catalog on your letterhead.

WANTED

OLD GRUNOW CARRENE METERS
Offering $1.00 Each

Ship to Us Any Quantity, Check Will Be Sent Immediately.

Service Parts Company **2511 Lake St. Melrose Park, Ill.**

ARMY-NAVY "E" AWARD TO BONNEY FORGE & TOOL

AWARD of the Army-Navy "E" to the men and women of Bonney Forge & Tool Works, Allentown, Pa., was announced on September 5, by Under Secretary of War Robert P. Patterson, "for great accomplishment in the production of war equipment."

Formal presentation of the Army-Navy "E" Flag was made at appropriate ceremonies in the new Bonney-Whitehall Building, Allentown, Pa., on October 2nd, by Major H. R. Battley, District Public Relations Officer, Army Air Corps, to Fred S. Durham, President of Bonney Forge & Tool Works.

In accepting the award on behalf of the company, Mr. Durham said, "I am assured that we as a group, and individually, will keep our pennant flying proudly so that the Army and Navy will know this award was well considered and well placed. In four short words I have pledged myself and all of you (Bonney employees) to give everything we have in this, our Country's greatest need . . . 'We Will Not Fail.' "

Presentation of the Army-Navy "E" Lapel Pins to the employees was made by Lt. Com.

ARMY-NAVY "E" FLAG AWARDED TO EMPLOYEES OF BONNEY FORGE & TOOL WORKS

Reading from left to right: Fred S. Durham, president; J. Edward Durham, Jr., vice-president; Arthur J. Male, secretary and treasurer, Bonney Forge & Tool Works; Maj. H. R. Battley, District Public Relations Officer, who made presentation of "E" flag; Dr. Chas. R. Penrose, master of ceremonies; Lt. Com. John R. Craig, Office of Inspector of Naval Material, who made presentation of "E" pin; Geo. A. Schweikert, foreman, Machine Shop, who accepted "E" pin for employees.

To Promote The War Effort

—this organization has expanded its facilities to include training in WELDING and DRAFTING. Meanwhile we continue, as usual, our training in Refrigeration and Air Conditioning—the Industry which we have so long been a part of and served.

● **UTILITIES ENGINEERING INSTITUTE**
W. Belden & Wayne Aves. Dept. 45 Chicago, Ill.

EXPANSION VALVES

Rebuilt or Exchanged

Automatic (any make).....$1.25
Thermostatic (any make).....$2.75
Water valves $2.25

COLD CONTROLS

Domestic $2.00
Commercial (low or pressure).....$2.25
Commercial (high & low).....$2.75

All work done on money back guarantee.
Special price on quantity.
(All fittings must accompany order)

REFRIGERATION SURPLUS DEALERS
2209 N. Karlov Ave. Chicago, Ill.

John R. Craig, Office of Inspector of Naval Material, Bethlehem District, and accepted by George A. Schweikert, representing the employees. Mr. Schweikert has an unbroken record of 52 years service with Bonney. The presentation ceremony was broadcast over radio station WCBA, Allentown, Pa.

PRESIDENT OF TURNER BRASS RECEIVES ARMY PROMOTION

MAJOR JOHN SLEZAK, head of the tank branch of the Chicago Ordnance District and now acting chief of the industrial division, has been promoted to the rank of lieutenant colonel, as announced by Brig. Gen. Thomas S. Hammond, I. N. G. (Ret.) deputy district chief.

LT. COL. JOHN SLEZAK

Commissioned a second lieutenant in the Ordnance reserve in 1924, Colonel Slezak was called to active duty with the Chicago Ordnance District in January of this year. He first served as assistant chief of the ammunition branch and in March he was promoted to chief of the tank branch. In this assignment his work involved the procurement of tanks, combat cars, armored scout cars, self-propelled mounts, armored personnel and arms carriers and special ordnance vehicles and gun mounts.

Colonel Slezak is on leave of absence from his position as president of The Turner Brass Works, Sycamore, Illinois.

He is an engineering graduate of the University of Wisconsin, class of 1923. Prior to becoming affiliated with the Turner Brass Works in 1932, he was employed by the Western Electric Company where he was head of the metal machining method division.

For the PERMANENT REPLACEMENT of STRATEGIC MATERIALS
SARAN
CHEMICALLY RESISTANT TUBING AND FITTINGS BY
HODGMAN
Saran Tubing by Hodgman is a tough thermoplastic specially made to replace strategic materials such as aluminum, stainless steel, nickel, copper, brass, tin and rubber. It is adaptable for use under high working and bursting pressures and is resistant to most chemicals. Its insulating qualities, flexibility and ease of bending make it extremely valuable in installations requiring the transport of oil, gas, air, water and corrosive chemicals . . . Flare type fittings of the same material make it possible to install a complete system with no more tools than a sharp knife and a flaring tool.
*Pat. No. 2100931
Send FOR DATA SHEET AND FREE SAMPLE.
Send FOR COMPLETE INFORMATION SHEET AND FREE SAMPLE
HODGMAN RUBBER CO.
FRAMINGHAM, MASS.
NEW YORK
CHICAGO
SAN FRANCISCO

WEST COAST CONTROL SERVICE

Cold Controls • Pressure Switches
Expansion Valves

Reconditioned in one to three days with an unconditional one year guarantee.

Original Factory Specifications

UTILITY THERMOSTAT CO.
4011 Halldale Ave., Los Angeles, Calif.

Condenser Cooling Fans

All you want without priority, at sensational prices. Write, wire or call.

Have you received our latest catalog No. 138, just off the press?

THE HARRY ALTER CO.
(Two Big Warehouses to Serve You)
1728 S. Michigan Ave., Chicago, Ill.
134 Lafayette St., New York, N. Y.

COLD CONTROLS & EXPANSION VALVES

repaired or exchanged

at the following prices, F.O.B. Chicago

Automatic Expansion Valves (All Makes)	$1.50
Thermostatic Expansion Valves	3.25
Automatic Water Valves	2.50
Domestic Cold Controls (Modern Type)	2.50
Commercial Controls (Temp. or Pressure)	2.75
Commercial Dual Controls	3.25

ALL WORK GUARANTEED FOR 90 DAYS

Write for quantity prices

NEW DUTY
2424 Irving Park Blvd., CHICAGO

GASKETS — SPEED VICTORY

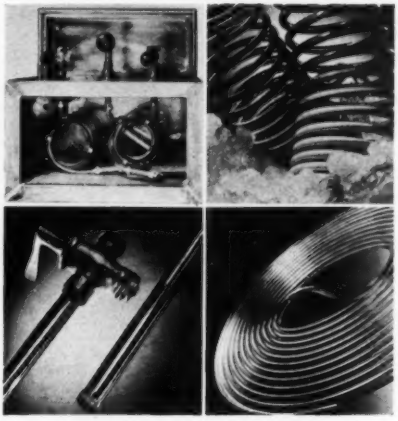
Write for complete catalog.

● Our long experience and complete facilities enable us to furnish the exact gaskets for every refrigeration need. Our service to manufacturers, to jobbers and to service men helps speed war production as well as ordinary requirements.

CHICAGO-WILCOX MFG. CO.
7701 Avalon Ave. Chicago, Illinois

PLASTIC TUBING TO REPLACE BLOCK TIN

TRANSPARENT TENITE pipe is now available in the standard sizes used in beverage dispensing industries. According to the distributor, it has already been accepted by leading breweries to replace block-tin pipe in the brewing industry and in dispensing draft beer. The Tenite pipe is used to carry the beer from the kegs, through the cooling system, to the taps in the bar dispenser. It can be formed into spiral and flat coils for the commercially used ice-cooling



Tap rods of Tenite tubing, flat coils for beverage cooling, spiral coils for ice cooling and beer cooling coils, all illustrated above, are only a few of the many uses to which plastic tubing is being put. Tenite pipe may be readily coiled, bent, formed, threaded and curved to fit any condition. It is being widely used in the beer dispensing business to replace block tin tubing.

AIRO SUPPLY CO.

2732 N. Ashland Ave.
CHICAGO, ILL.

Wholesale Distributors

Refrigeration and Air Conditioning

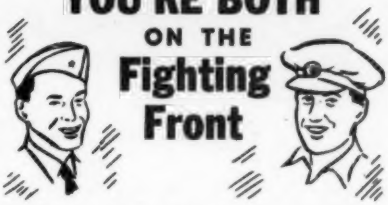
PARTS • TOOLS • SUPPLIES

systems and also may be used with advantage on the direct draw systems with automatic refrigeration.

This new plastic pipe possesses many advantages not found in other-type piping. Its transparency allows the beer to be observed throughout its flow from barrel to faucet, so that any obstruction that might occur in the line may be readily located. The pipe is kept clean and sanitary by the customary cleaning devices now in use, and it can be used in conjunction with all present standard beer connections and fittings. The inside surface is perfectly smooth and is said to be more uniform than any other beer pipe used heretofore or on the market today. According to the distributor, the beer is conducted through this pipe without losing any of its color, flavor and head—exactly as it is brewed at the brewery.

Tenite pipe is manufactured from a cellulose acetate butyrate formula produced by Tennessee Eastman Corp. and distributed by North Penn Co., under the name of "Penn-co." The pipe is stocked in both long length coils and 12-foot straight lengths. The diameters range from 3/16 inch O.D. to 1½ inch O.D.

YOU'RE BOTH
ON THE
Fighting
Front



● Yes, sir, Mr. Service Man, both you and the boys in uniform are on the fighting front. Refrigeration's job in this war effort is big . . . in camps, planes, industry, ships and hospitals, refrigeration plays an important part.

It's up to you to keep this equipment in top running order . . . and we're here to help. Write for our new catalog on STANGARD Prime Surface Cold Plate applications, including 24 pages of valuable technical data. Write today!

The Stangard-Dickerson Corp.
46-76 Oliver Street Newark, N. J.

Electrimatic
Solenoid Valves

Type SL
For Freon, Methyl, Sulphur
Oil, Air and Water
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Be sensible. Stop abusing *your* tools. Take care of them. They must last you for the duration. These few simple suggestions will help you get the most out of your tools—

- First, make sure you use the *right* tool for every job . . . the *right* size as well as the *right* type. *Don't* use a screw driver as a pry bar and expect it to remain in good condition. It won't.
- *Stop* using a pipe over the end of a wrench or socket extension for added leverage . . . unless you don't care about ruining the tool and perhaps hurting yourself.
- *Stop* throwing them on the floor and kicking them around . . . you wouldn't kick a $5.00 bill around very long. It's just as easy to put them back in your tool box and they will last longer.
- Give your tools a "break." Clean off the grease and dirt at least once a week . . . oftener if necessary.

You'll be doing yourself a real service if you follow this common-sense advice. Remember, your present tool kit has a big service job to do. *Be Smart.* It will pay dividends.

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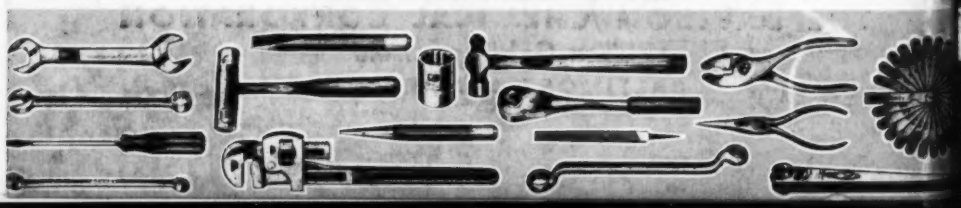
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